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INPUT-OUTPUT  
TABLES FOR THE  
UNITED KINGDOM  
1954



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## INTRODUCTION

THIS publication has been prepared jointly by the Board of Trade and the Central Statistical Office. It contains a set of input-output tables for the United Kingdom in respect of the year 1954. These tables revise and greatly amplify the provisional and very much less detailed tables which were published in *National Income and Expenditure, 1958*, H.M.S.O., 1958, (the National Income Blue Book for 1958), and later reproduced, together with a short commentary, in the December 1958 issue of *Economic Trends*(<sup>1</sup>).

Input-output tables present transactions between different industry groups which are not normally shown in conventional national income and expenditure tables. National income statistics provide, *inter alia*, a classification of income by kind of income and by industry of origin, and an analysis of expenditure by kind of expenditure, but they do not normally show inter-industry transactions even though the national income is itself an end result of these transactions.

Input-output tables show the extent to which one industry is dependent on another both for the sale of its output and for its purchases of inputs, and how far each industry's sales are dependent on consumption, investment and exports (that is, on each of the various forms of final expenditure). The tables in this publication are designed to set out these average input-output relationships for the year 1954(<sup>2</sup>).

It must be recognised that the average relationships given in the tables for the year 1954 may not be applicable to a more recent year, or be the same as the marginal relationships which would apply for changes in output and expenditure. These limitations are discussed on page 8.

Details of the sales and purchases of 46 different industry groups in 1954 are given in Table A—the first of the large tables at the back of this booklet. This table is the basic input-output flow table from which various average input-output relationships may be derived. A summary of this table is given in Table 1, which also shows how the transactions of 12 major industry groups can be integrated into the framework of the national income and expenditure accounts. Table B presents an analysis of the purchases of each of the 46 industry groups in terms of 44 groups of commodities. Table C analyses the sources of supply of each of the 44 commodity groups. The other tables in this publication are all derived from Tables A, B and C. Tables D, E and F at the back of the booklet and Tables 3 to 6 in the text show the extent to which each industry was dependent on other industries and on imports for its supply of inputs in 1954. Tables 7 to 11 in the text show the contribution each industry group, imports and incomes have made towards meeting the various forms of final expenditure.

A description of the sources and methods used in making the estimates given in the input-output flow tables is given in Appendix A. Definitions of the technical terms referred to in the text and used in the tables are brought together in a glossary in Appendix B.

April, 1961.

(<sup>1</sup>) Summary input-output tables for the years 1946, 1950 and 1954 have been published in various National Income Blue Books since 1952. More detailed tables have been prepared by Mr. T. Barno for the year 1935, (T. Barno, "The Interdependence of the British Economy", *Journal of the Royal Statistical Society, Series A (General)*, Volume CXV, Part 1, 1952), and by the Department of Applied Economics, Cambridge, with the collaboration of the Board of Trade for the year 1948, (J. G. Stewart, "Input-Output Table for the United Kingdom", *London and Cambridge Economic Studies, The Times Review of Industry*, December, 1958).

(<sup>2</sup>) The year 1954 is the latest one for which detailed information about both output and input is available for manufacturing industries.

## THE INTER-INDUSTRY FLOW TABLE, 1954

TABLE A, at the back of this booklet, gives details of the transactions on current account of 46 different industry groups for the United Kingdom in 1954. This is the basic flow table from which various average input-output relationships may be deduced. The figures in the table relate to sales and purchases of goods and services; transactions in financial assets and transfer payments and receipts are excluded.

In the table the United Kingdom economy is divided into forty-six industry groups. For each industry group estimates are given of:

- (a) Its purchases for use in current production of the goods and services produced by each of the other industries or imported, and its payments for the services rendered by factors of production, (equal in total to gross domestic income, before providing for depreciation). These purchases are shown in the columns of the table.
- (b) Its sales to each of the other industries and to final buyers. These are shown in the rows of the table. That part of the output of each industry sold to other industries for current use is known as intermediate output; that part of the output sold for final consumption by persons and public authorities, for investment (including additions to stocks and work in progress) and for export is known as final output (or sales to final buyers). The distinction between these two forms of output follows the definitions used in the National Income Blue Book.

### Definition of total output

The total output (or "gross output") of each industry group in Table A is the aggregate value of the goods made and other work done by the establishments within the industry group. It is equal to the value of the industry group's sales *plus* any increase (and *less* any decrease) in the value of its stocks of finished products and work in progress. Output is measured "free from duplication" in the sense that the output of establishments sold to other establishments within the same industry group are excluded. Consequently, there is no figure shown in the leading diagonal of Table A. Measuring the total value of the output of the different industry groups free from duplication makes it independent of the structure and organisation of the industry group and of the number of establishments in the industry for which returns are made. This definition of gross output does not correspond to that shown in the census of production where the figures relate to all sales by establishments, including those to other establishments in the same industry.

The figures of output for each industry group include not only the value of the principal products of the industry group (that is, the products typical of the industry), but

also the secondary products produced. Thus woollen cloth produced as a secondary product by the Cotton and man made fibres industry group (which would be a principal product of the Woollen and worsted industry) is included in the total output of the Cotton and man made fibres industry, and the corresponding input of woollen yarn is included with the purchases by that industry.

The value of the output of the transport and distributive trades (part of the output of the Services industry group) is measured by the gross margin on the goods transported or sold. It is thus equal to the gross domestic income generated by these industries plus the cost of the goods and services they use themselves in providing their services, but it does not include the cost of the goods transported or distributed. In effect, manufacturers and overseas suppliers are regarded as selling directly to the industries or to the final buyers who buy from the distributor and the transporter; the latter are treated as agents who sell only their services.

The industry group Public administration, etc., comprises public administration and defence, public health and educational services, ownership of dwellings, domestic services to households, and services of private non-profit making bodies serving persons<sup>(1)</sup>. The common feature of these industries is that their gross output is taken as being equal to the gross domestic income generated by them, and all their output is sold as final output to final buyers. Purchases of goods and services by public authorities and by private non-profit making bodies serving persons and maintenance expenditure by landlords on dwellings are recorded in column 43 of Table A as direct purchases by final buyers from the appropriate industry. This is the most satisfactory way of dealing with these purchases.

### Valuation of transactions

All transactions in goods and services are valued at *seller's prices*—the net amount received by the seller—as distinct from *buyer's prices*—the net amount paid by the purchaser. The difference between the two represents transport, distribution and service charges paid by the purchaser and not included in the seller's price. In some cases sellers value goods sold on a "delivered" basis, as opposed to an "ex-works" basis, and include in their prices an amount to cover the cost of transporting the goods sold. In these cases transport charges are included in the seller's price. This method of pricing applies, for example, to the goods sold by the Other mining and quarrying industry group and by the Building materials industry group. This definition of selling price is the same as the definition of net selling value followed in the Census of Production for 1954.

Purchases by an industry from the Services industry group comprise (a), expenditure on direct services such as advertising, communication services, etc., (b), the value

<sup>(1)</sup> Details of the composition of this industry group are given on page 20 in Appendix A.

of the services rendered by the transport and communication industry and the distributive trades in handling goods bought by the industry from other industries and from abroad, providing they are not already included in the seller's price, (c), payments for the transport of goods sold by the industry, if included in its selling price, and (d), the difference between the seller's price and the purchaser's price of goods sold by one establishment to another within the same industry group. Purchases by final buyers from the Services industry group comprise (a), expenditure on direct services such as entertainment, travel, communication services, etc., and (b), the value of the services rendered by the transport and communication industry and the distributive trades in handling the goods bought, including imported goods.

The advantage of recording all transactions at seller's prices and not at the price paid by the purchaser is that the figures of sales to both other industries and to final buyers within each row are on the same price basis and are, as far as possible, directly comparable. This method of valuation also has the merit of simplifying the analysis of average input-output relationships given in later tables.

Imports of merchandise are valued c.i.f., that is including cost, insurance and freight, as in the *Annual Statement of Trade of the United Kingdom*.

#### Definition of input

The transactions in Table A relate to purchases of goods and services and not to their actual usage. The difference between the two is equal to the value of the change in the physical volume of stocks of materials and fuel held. Ideally, the inputs into each industry should relate to actual usage valued at the average prices of the year, but it has not been possible to adjust the figures of purchases on to this basis for the 46 industries shown. Changes in the total value of stocks of materials and fuel (inputs) are, however, shown separately in row 50 of Table A.

Taxes on expenditure and subsidies are generally treated as being paid for or received by the manufacturer selling the taxed or subsidised goods, that is, as positive or negative inputs respectively. Thus duty on tobacco is included as a positive item in row 51 of column 34 and subsidies on foods as a negative item in row 51 of column 32 and 33. Customs duty paid on motor spirit bought by the Services industry group is included in row 51 of column 45, and by personal consumers in row 51 of column 48. For consistency with the treatment of transport and distributive services, however, purchase tax (which is paid at the wholesale stage), and customs duties paid by wholesalers on imported goods which enter directly into final output without further processing in the United Kingdom, are treated as if they were paid for directly by the final buyer. They, therefore, appear only in row 51 of column 48. Rates on dwellings and some miscellaneous taxes on expenditure, such as motor vehicle duties and dog licences, are also included here.

Sales by final buyers (row 49) include sales by industry of second-hand vehicles, ships, plant and machinery for scrap or to persons or for export, and sales by persons of scrap for industrial use. (See Table I and page 23 of Appendix B for further details).

#### Treatment of imports

The figures of merchandise imports in row 47 of Table A relate to total imports, including those subsequently re-

exported, valued c.i.f. They are treated as if they were the output of a separate industry group and are allocated according to the industries purchasing them. Imports which enter directly into final demand without further processing in the United Kingdom (e.g. bottled wines and spirits, machine tools, motor spirit, carpets, clothing, etc.), together with re-exports, are included in row 47 of column 48. No distinction is made between "competitive" and "non-competitive" imports of merchandise, that is to say, between imports of those commodities which are also produced in this country and imports of those which are not. This treatment of imports is in line with the treatment of secondary products noted above on page 1. An analysis of retained merchandise imports by commodity group is given in Table C.

Imports of services are shown in row 48 of Table A. These are allocated in the same way as imports of merchandise. The excess of imports of merchandise valued c.i.f. in the trade statistics over imports of merchandise valued f.o.b. in the balance of payments statistics, together with other coverage adjustments on imports of merchandise, is included in this row as a negative item and is treated as a purchase by the Services industry group in column 45.

#### Relation to estimates of national income

Table A displays the intermediate transactions between industry groups which are not apparent from conventional national income tables. The figures are consistent with, but are presented in a different way from those published in the *National Income Blue Book* for 1960.

The gross domestic product (a measure of the value of the goods and services produced in the country) may be derived from the figures in the following two ways:

	£ million
(i) Gross domestic income (the total in row 52) .. .. .	15,814
less Stock appreciation (from column 20 of Table I) .. ..	-75
equals Gross domestic product at factor cost .. .. .	15,739
(ii) Total final expenditure and output, including stock appreciation (the sum of the totals in columns 47 and 48) .. .. .	21,527
less Stock appreciation (from column 20 of Table I) .. ..	-75
less Net taxes on expenditure (the total in row 51) .. .. .	-2,061
less Imports of merchandise (c.i.f.) (the total in row 47) .. ..	-3,368
less Imports of services (included in row 48) .. .. .	-632
plus Insurance, freight and other coverage and timing adjustments on imports of merchandise (included as a negative item in row 48 of column 45) .. ..	348
equals Gross domestic product at factor cost .. .. .	15,739

#### Summary input-output flow table

A convenient summary of the input-output relations in 1954 is provided by Table I. This table presents the data on exactly the same basis as that used in the National Income Blue Book for 1960, and provides an analysis by major industry groups of each of the various forms of final expenditure.

The total output of each major industry group in Table I is measured free from duplication, as in Table A. As the coverage of almost all the industry groups is wider in Table I than in Table A, the extent of the duplication of sales within the industry groups in Table I is greater. This explains why the value of the total output of each of the major industry groups in Table I is less than the aggregate value of the total output of each of its constituent industry groups shown in Table A.

In Table I, gross domestic income is divided between wages, salaries and other income from employment on the one hand, and gross trading profits and other trading income on the other. The row for imports comprises total merchandise imports, including those subsequently re-exported, valued f.o.b., plus imports of services. This treatment of imports of goods and services corresponds to that followed in national income and balance of payments statistics. The inputs by the different industries relate to actual usage and not to purchases—the change in the value of the stocks of materials and fuel (shown in row 50 of Table A) has been allocated over the various purchases, including purchases from within the industry group. Also, the change in the value of stocks and work in progress is divided between the physical change (shown in column 17 of Table I) and stock appreciation (shown in column 20).

Sales by final buyers to one another are shown in more detail in Table I than in Table A as they are not consolidated. They include payments by persons to public authorities for goods and services provided under the National Health Service and for miscellaneous services rendered. They also include export sales by the Government. (More details are given on page 23 of Appendix B).

Whereas Table A shows the detailed relations between the transactions of the different industry groups, Table I shows how these transactions, together with the transactions of final buyers, can be integrated into the framework of the national income accounts. Thus, Table I may be more useful than Table A for examining in broad terms the relations between the output of major industry groups, incomes, imports and the various forms of final expenditure.

The gross domestic product may be derived from the figures in Table I in the following two ways:

	£ million
(i) Income from employment (the total in row 17) .. .. .	10,253
Gross profits and other trading income (the total in row 18) ..	5,561
less Stock appreciation (the total in column 20) .. .	—75
equals Gross domestic product at factor cost .. .. .	15,739

(ii) Total final expenditure or output (the total in column 19) ..	21,452
less Imports of goods and services (the total in row 13) .. ..	—3,652
less Net taxes on expenditure (the total in row 16) .. .. .	—2,061
equals Gross domestic product at factor cost .. .. .	15,739

#### Classification of industries

The classification of industries followed in Table A was determined largely by the information readily available. On the one hand, there is a considerable amount of information about input and output available for 1954 for the industries covered by the census of production—viz. mining and quarrying, manufacturing, gas, electricity and water, and building and contracting; on the other hand, there is little information available for the distributive trades, transport and communication and the miscellaneous service industries. No attempt has been made to distinguish these service industries separately; the aim has been to concentrate attention on the flows between the industries covered by the census of production. The classification of industries adopted broadly follows the old Standard Industrial Classification (1948), and is on an establishment basis. It is in most cases similar to that used in the input-output table for 1948, prepared by the Department of Applied Economics, Cambridge, with which comparisons may be made. A description of the composition of each of the 46 industry groups is given in Appendix C.

The classification of industries in Table I is on a different basis from that in Table A. The figures have been adjusted to follow, as far as possible, the new Standard Industrial Classification (1958), so that the figures for each industry group are on precisely the same basis and are comparable with those given in the National Income Blue Book for 1960. This difference in definition explains, for example, why the figures of output for the Construction industry in Table I are bigger than those for the Building and contracting industry in Table A.

#### Nature of the estimates

The estimates in Table A and Table I are shown as precise numbers but they should not be regarded as accurate to the last digit shown; they are estimates which are subject to error and not precise accounting figures. For the convenience of the reader the estimates of inter-industry transactions in Table A are shown to one decimal place of £ million although many of them are not accurate even to the nearest £ million. This applies particularly to the estimates for the Building and contracting and the Services industries. Another reason for not rounding the figures is that the degree of detail shown is that which has been used in carrying out further calculations the results of which are given in later tables.

A description of the sources and methods used in making the estimates in Table A is given in Appendix A.

## Summary input — output

TABLE I

Saler by industry group	Purchaser by industry group	Agriculture, forestry and fishing	Mining and quarrying	Food, drink and tobacco	Chemicals and allied industries	Metal manufacture	Engineering and allied industries	Textiles, leather and clothing	Other manufacturing	Construction
		1	2	3	4	5	6	7	8	9
1. Agriculture, forestry and fishing ..	—	—	583	—	—	—	—	14	10	—
2. Mining and quarrying .. ..	9	—	14	132	34	29	19	75	31	—
3. Food, drink and tobacco .. ..	232	—	—	18	—	—	2	2	—	—
4. Chemicals and allied industries ..	110	17	100	—	97	160	54	95	72	—
5. Metal manufacture .. ..	1	25	7	23	—	772	5	16	116	—
6. Engineering and allied industries ..	60	43	63	35	95	—	61	78	121	—
7. Textiles, leather and clothing .. ..	8	6	14	10	3	45	—	34	6	—
8. Other manufacturing .. ..	14	30	84	51	19	204	39	—	272	—
9. Construction .. ..	35	25	8	6	6	19	13	9	—	—
10. Gas, electricity and water .. ..	13	16	16	29	29	55	19	31	6	—
11. Services .. ..	164	82	327	237	228	619	365	296	148	—
12. Public administration, etc.(1) ..	—	—	—	—	—	—	—	—	—	—
13. Imports of goods and services ..	96	12	486	343	210	166	449	263	54	—
14. Sales by final buyers to one another(2)	—	—	—	—	30	—	8	1	—	—
15. Goods and services .. ..	742	256	1,704	889	751	1,402	947	970	826	—
16. Taxes on expenditure less subsidies ..	—169	7	850	23	3	31	10	18	13	—
17. Income from employment .. ..	304	409	274	229	297	1,566	574	456	708	—
18. Gross profits and other trading income (3) .. ..	462	64	365	243	185	789	256	305	194	—
19. Total input(4) .. ..	1,339	816	3,135	1,364	1,236	4,094	1,787	1,930	1,561	—

(1) Public administration and defence, public health and educational services, ownership of dwellings, domestic services to households and services to private non-profit-making bodies serving persons.

(2) Measured free from duplication.

(3) Includes sales by final buyers for scrap.

(4) Before providing for depreciation and stock appreciation.

(5) Includes the "statistical error" in the national income accounts amounting to £250 million.

Flow table for 1954

£ million

Gas, electricity and water	Services	Public adminis- tration, etc.(2)	Total inter- mediate output	Final buyers					Total final output	Stock apprecia- tion	Total output(2)	
				Persons	Public adminis- tration	Gross domestic capital formation		Exports				
						Fixed	Stocks					
10	11	12	13 (1 to 12)	14	15	16	17	18	19 (14 to 18)	20	21 (1) + 19 + 20	
—	—	—	600	679	3	—	9	32	718	12	1,333	1.
151	96	—	600	140	15	15	—41	53	213	3	816	2.
—	43	—	257	2,678	22	—	—10	143	2,833	5	3,135	3.
17	117	—	779	896	95	4	35	290	619	—5	1,384	4.
18	18	—	1,061	15	10	20	10	175	230	5	1,256	5.
43	280	—	839	256	628	936	10	1,163	3,164	35	4,898	6.
1	47	—	217	967	30	—	60	453	1,550	—	1,787	7.
14	378	—	1,105	477	80	35	30	198	820	5	1,890	8.
2	188	—	215	234	195	1,090	—20	—	1,501	15	1,516	9.
—	153	—	567	309	43	69	—2	4	623	—	738	10.
95	—	—	2,261	3,698	482	269	4	882	5,216	10	7,507	11.
—	—	—	—	791	1,494	—	—	—	2,195	—	2,195	12.
9	300	—	2,396	998	301	82	—30	540	1,266	—10	3,652	13.
—	—	—	39	75	—234	—55	—5	79	—29	—	—	14.
300	1,531	—	10,815	11,432	3,079	2,588	59	2,619	20,711	75	31,688	15.
31	529	—	1,327	804	80	78	—	—	754	—	2,061	16.
199	2,513	1,602	10,233	—	—	—	—	—	—	—	10,233	17.
160	2,136(2)	533	5,561	—	—	—	—	—	—	—	5,561	18.
783	7,907	2,195	27,956	12,856	3,139	2,588	30	2,619	21,432	75	49,483	19.

# SUPPLY AND ALLOCATION OF COMMODITIES

## Commodity analysis of purchases

Table A gives details of the purchases of 46 industry groups according to the industry groups producing them; for this purpose imports are treated as if they were the output of a separate industry. For some purposes it is also useful to have an analysis of industries' purchases by groups of commodities. An analysis of this kind is given in Table B where purchases of commodities are classified according to the industry which produces them as a principal product (that is, the industry to which establishments mainly producing them would be assigned in the Standard Industrial Classification) regardless of whether the commodity is home produced or imported. For example, purchases by the Clothing industry of imported woollen cloth and of woollen cloth made by the Cotton and man-made fibres industry are both classified as purchases from the commodity group Woollen and woested.

Imports of goods which are not produced in the country ("non competitive" imports), are classified to the commodity group corresponding to the industry which would produce them as a principal product in their country of origin. For example, imports of crude oil are classified to the commodity group Other mining and quarrying, and imports of tobacco and of crude rubber to Agriculture, forestry and fishing. In Table B, purchases of imported goods include the customs duties paid on them.

The figures in the leading diagonal in Table B include sales by one establishment to another within the same industry group as well as purchases of imports. This explains why the total input of each industry shown in row 51 of Table B is in most cases larger than the total shown in row 53 of Table A. The estimated amount of the duplication of sales and purchases between establishments within each industry group can be measured by comparing the figures in row 51 of Table B with those in row 53 of Table A.

The figures of exports for which a detailed analysis is given in Table B relate to exports of United Kingdom goods and services, whereas the figure of exports included in row 47 of column 46 of Table A and in row 13 of column 18 of Table 1 also includes re-exports of imported merchandise. This is the reason why the sum of the totals in columns 46, 49 and 50 in Table B is less than the sum of the totals in columns 47 and 48 of Table A.

## Relation to estimates of national income

The gross domestic product may be derived from the figures in Table B in the following two ways:

	£ million
(a) Gross domestic income (the total in row 50) .. .. .	15,814
less Stock appreciation (from column 20 of Table 1) .. .. .	—75
equals Gross domestic product at factor cost .. .. .	15,739

(b) Exports (the total in column 48) ..	3,519
plus Increase in value of stocks and work in progress (the total in column 46) .. .. .	128
plus Personal and public consumption and gross fixed capital formation (the total in column 50)	17,783
	21,427
less Residual imports of merchandise (from column 46 of Table C)	—3,268
less Imports of services (included in row 45) .. .. .	—632
plus Insurance and freight, etc., on imports of merchandise (included in row 45 of column 45) ..	348
less Customs duties on imports (from column 47 of Table C) ..	—1,095
less Excise duties, local rates and other taxes on expenditure plus subsidies (the total in row 49) ..	—966
less Stock appreciation (from column 20 of Table 1) .. .. .	—75
equals Gross domestic product at factor cost .. .. .	15,739

## Commodity analysis of sales

Table C provides an analysis of the supply of each of 44 commodity groups in terms of its source of supply<sup>(1)</sup>. It shows for each commodity group how much is produced by the industry group for which they are principal products, how much is produced as secondary products by other industries, how much is imported, and the amount of customs duty paid on the imported goods. The total supply of each commodity group in the final column of Table C is equal to the total purchases by industry and by final buyers of each commodity group in the final column of Table B.

Table 2 summarises in percentage form some of the information given in Table C. The first column in Table 2 shows the output of the principal products of each industry group expressed as a percentage of its total output. (That is, the figure in the leading diagonal in Table C as a percentage of the figure in row 45 in Table C). This comparison provides an indication of the degree of specialisation of each industry group. Commodities produced as secondary products and not as principal products were relatively unimportant in most industry groups and amounted to 10 per cent. or more in only five of them. The second column in Table 2 shows output produced as principal products as a percentage of the total output of each commodity group. (That is the figure in the leading diagonal in Table C as a percentage of the figure in column 45). This ratio has sometimes been described as

(1) There are 44 commodity groups as opposed to 46 industry groups in this table, as there are no commodity groups corresponding to the Services industry group or to Public administration, etc.

Analysis of output in 1954<sup>(1)</sup>

TABLE 2

Percentages

Industry or commodity group	Output of "principal products" of each industry group as a percentage of the industry group's total output	Output produced as "principal products" as a percentage of the total output of each commodity group
1. Agriculture, forestry and fishing .. .. .	100	100
2. Coal mining .. .. .	100	100
3. Other mining and quarrying .. .. .	93	97
4. Coke ovens and coal tar products .. .. .	91	91
5. Chemicals and dyestuffs .. .. .	92	91
6. Drugs and perfumery .. .. .	96	89
7. Soap, polishers, etc. .. .. .	91	92
8. Mineral oil refining .. .. .	96	96
9. Oils and greases .. .. .	96	95
10. Paper, plastic materials, etc. .. .. .	94	93
11. Iron and steel—melting, rolling and castings .. .. .	94	96
12. Iron and steel—tin plate and tubes .. .. .	96	96
13. Non-ferrous metals .. .. .	92	90
14. Motors and cycles .. .. .	91	97
15. Aircraft .. .. .	91	93
16. Railway rolling stock, etc. .. .. .	88	92
17. Shipbuilding and marine engineering .. .. .	97	95
18. Mechanical engineering .. .. .	95	89
19. Electrical engineering (generally) .. .. .	85	89
20. Radio and tele-communications .. .. .	85	94
21. Hardware and hollow-ware .. .. .	89	92
22. Precision instruments, jewellery, etc. .. .. .	91	85
23. Miscellaneous metal manufactures .. .. .	91	93
24. Cotton and man-made fibres .. .. .	99	98
25. Woollen and worsted .. .. .	99	99
26. Hosiery and lace .. .. .	97	99
27. Other textiles .. .. .	95	92
28. Textile finishing and packing .. .. .	99	99
29. Leather and fur .. .. .	100	98
30. Clothing .. .. .	99	98
31. Boots and shoes .. .. .	98	100
32. Cereal foodstuffs .. .. .	99	96
33. Other manufactured foods .. .. .	96	99
34. Drink and tobacco .. .. .	100	99
35. Timber and furniture .. .. .	97	97
36. Paper and board .. .. .	96	97
37. Printing and publishing .. .. .	97	96
38. Rubber .. .. .	95	97
39. Glass and glassware .. .. .	99	98
40. Building materials .. .. .	97	95
41. Miscellaneous manufactures .. .. .	93	92
42. Building and contracting .. .. .	99	99
43. Gas and water .. .. .	97	94
44. Electricity .. .. .	100	99

(1) The percentages in this table are derived from Table C.

"the degree of exclusiveness" of the commodity group. Output produced as secondary products and not as principal products amounted to 10 per cent. or more of total production in only four commodity groups. The relative importance of principal products and secondary products depends, of course, on the size of the industry groups chosen.

It is not possible to make a valid comparison of the figures of imports analysed by commodity groups and the corresponding figures of home production in Table C, since the figures of home production include duplication to the extent that some of the goods produced are sold to other establishments classified to the same group. It is

better to compare imports with the estimates of home production measured free from duplication given in Table A. But even here there is duplication to the extent that imports included in a group may be used for producing commodities classified to the same industry group. For example, imports of pig iron, classified to the iron and steel-melting, rolling and castings group, are used to produce steel blooms, billets and slabs which are also classified to the iron and steel-melting, rolling and castings industry group. Also, imports of cotton yarn, classified to the Cotton and man made fibres group, are used to produce cotton cloth which is also classified to this industry group.

# REQUIREMENTS PER £100 OF INDUSTRIAL OUTPUT

## Direct and indirect requirements

The figures in the columns of Table A show the extent to which each of the 46 industry groups was dependent on other industries and on imports for its supply of inputs on current account in 1954. From the figures in each column can be deduced the inputs required on average by each industry to produce £100 of output. These are set out in Table D<sup>(1)</sup>. Column 14 of the table shows, for example, that in 1954, £100 of output by the Motors and cycles industry group required, on average, £11.9 of output from the Iron and steel-melting, rolling and castings industry group, 24.5 of output from the Mechanical engineering industry group, and £3.0 of output from the Electrical engineering (general) industry group, and so on. These are the *direct* requirements of the Motors and cycles industry group on other industries. There are also *indirect* requirements on current account to be allowed for. Thus the Motors and cycles industry bought on average £11.9 of output from the Iron and steel-melting, rolling and castings industry in order to produce £100 of output. The Iron and steel-melting, rolling and castings industry in its turn also has to buy goods and services from other industries in order to produce the £11.9 of output required by the Motors and cycles industry, and these other industries in their turn have to buy goods and services from others, and so on.

On the assumption that the inputs required by each industry group are proportional to each industry group's total output, the average relationships between the inputs (both direct and indirect) and the output of the industry group can be derived for the year 1954 from the intermediate transactions in Tables A. These relationships are given in Table E and summarised in Table 3 in the form of estimates of the gross outputs (both direct and indirect) required on average to produce £100 of final output by each industry group in 1954. The relationships were calculated by inverting a matrix of coefficients derived from the values of the intermediate transactions in Table A. This is equivalent to solving a set of simultaneous equations with these coefficients. A numerical example designed to explain in simple terms the meaning of "inverting the matrix" is given in Appendix D<sup>(2)</sup>.

The relationships given in Table E show the total output of each industry group required to produce £100 of final output by each of the 46 industry groups in 1954. These average relationships are determined partly by the homo-

geneity of the output of each industry group, which itself is partly determined by the classification of industries adopted. Generally, the finer the classification, the more homogeneous is the output of each industry. The more homogeneous is the output of an industry group, the greater is the likelihood that the average relationship between its pattern of inputs and its total output will be the same as the average relation between its inputs and its output over the whole range of its sales to other industries. A special difficulty is that the average input-output relationship for an industry would probably be different for that part of the industry's output added to stocks and work in progress than for that part which is actually sold. Fortunately, changes in stocks and work in progress were relatively small during 1954.

The relationships for the year 1954 given in Table E also depends on the structure of the relative prices of the inputs used in 1954. A different set of prices might have resulted in a different combination of inputs. They are also dependent on the productive techniques and processes used in 1954; different techniques and processes would probably have resulted in a different combination of inputs.

The relationships in Table E depend again on the extent to which each industry's requirements of particular inputs were met from home production and imports in 1954. The proportion of industry's total requirements of particular commodities met from imports can vary considerably<sup>(3)</sup>.

The input-output relationships for the year 1954 given in Table E do not show the extent to which requirements could be met from changes in stocks rather than from changes in current production<sup>(4)</sup>.

For those reasons the relationships for the year 1954 shown in Table E, and summarised in Table 3, may not be the same as the average relationships which would apply for a more recent year<sup>(5)</sup>, and they will probably not be the same as the marginal relationships which would apply for changes in output. These considerations are also true of the relationships shown in subsequent tables, which are all derived from and are dependent upon the relationships given in Table E.

It should be noted that the figures of requirements in Table E and in Table 3 are in terms of the gross outputs of the different industries, which include the value of their purchases of goods and services from other industries and

(1) The figures in Table D are derived from a modified version of Table A, by expressing each item of input as a percentage of the total input of the industry. The modifications involved two adjustments to Table A. First, rough estimates of stock appreciation were deducted from the figures of gross domestic income given in row 52 of Table A; second, the figures of stock changes in row 50 were allocated *pro rata* over the figures of materials purchased shown in rows 1 to 41 and 41 and over the purchases from establishments within the same industry group (which are not shown in Table A).

(2) It may be noted that Table E (and the summary Table 3) differ from the earlier tables in that each column stands on its own and is independent of the other columns; there is no connection between the figures appearing in any one row.

(3) For example, in 1954 imports of coal amounted to £37 million, in 1955 to £34 million, but in 1960 they were negligible. In 1954 imports of iron and steel amounted to £23 million, in 1955 to £28 million and in 1960 to £301 million.

(4) It may also be noted that the relationships do not show the extent to which an increase in output would require an increase in expenditure on fixed capital assets. The current cost of using fixed capital assets—depreciation—is, however, included in gross domestic income and is reflected in the figures of gross output for each industry.

(5) In the article describing the original summary input-output tables for 1954, which was published in the December, 1958 issue of *Economic Trends*, a comparison was made of the average input-output relationships in 1950 and 1954 for broad industry groups. The comparison showed that for these broad industry groups, with few exceptions, the requirements per £100 of final output were little different in the two years.

# Total requirements per £100 of final industrial output in 1954 in terms of gross output<sup>(1)</sup>

TABLE 3

£

Industry group	Agriculture, forestry and fishing	Mining and quarrying	Food, drink and tobacco	Chemicals and allied industries	Metal manufacture	Engineering and allied industries	Textiles, leather and clothing	Other manufacturing	Construction	Gas, electricity and water	Services	Public administration, etc.
Agriculture, forestry and fishing .. .. .	102	—	19	—	—	—	1	1	—	—	—	—
Mining and quarrying .. .. .	2	102	2	10	3	3	2	6	5	25	2	—
Food, drink and tobacco .. .. .	20	—	104	1	—	—	—	—	—	—	1	—
Chemicals and allied industries .. .. .	11	3	4	101	9	5	4	6	7	4	2	—
Metal manufacture .. .. .	3	3	1	3	103	20	2	2	9	5	2	—
Engineering and allied industries .. .. .	8	7	4	6	10	103	5	6	10	8	5	—
Textiles, leather and clothing .. .. .	2	1	1	1	1	2	100	5	2	1	1	—
Other manufacturing .. .. .	4	6	5	6	4	7	4	102	19	3	6	—
Construction .. .. .	3	3	1	1	1	1	1	101	1	1	2	—
Gas, electricity and water .. .. .	2	3	1	3	3	3	2	2	101	2	—	—
Services .. .. .	19	14	16	21	24	17	18	20	17	18	103	—
Public administration, etc. .. .. .	—	—	—	—	—	—	—	—	—	—	—	100
Imports of goods and services .. .. .	19	5	21	29	23	11	28	19	9	5	6	—
Taxes on expenditure less subsidies .. .. .	-12	2	27	4	2	2	2	3	2	6	8	—

(1) The entry in row p (a typical row) and column q (a typical column) represents the value of the gross output of industry p required to produce £100 of final output by industry q.

# Total requirements per £100 of final industrial output in 1954 in terms of net output<sup>(1)</sup>

TABLE 4

£

Industry group	Agriculture, forestry and fishing	Mining and quarrying	Food, drink and tobacco	Chemicals and allied industries	Metal manufacture	Engineering and allied industries	Textiles, leather and clothing	Other manufacturing	Construction	Gas, electricity and water	Services	Public administration, etc.
Agriculture, forestry and fishing .. .. .	58	—	11	—	—	—	1	—	—	—	—	—
Mining and quarrying .. .. .	2	69	1	7	3	2	1	4	3	17	2	—
Food, drink and tobacco .. .. .	3	—	19	—	—	—	—	—	—	—	—	—
Chemicals and allied industries .. .. .	3	1	2	35	3	2	1	2	2	1	1	—
Metal manufacture .. .. .	1	2	1	1	61	8	—	1	4	2	1	—
Engineering and allied industries .. .. .	4	4	2	3	6	57	3	3	5	5	3	—
Textiles, leather and clothing .. .. .	1	1	—	1	—	1	47	2	1	—	—	—
Other manufacturing .. .. .	2	3	2	1	2	3	2	50	9	2	3	—
Construction .. .. .	2	2	1	1	1	1	1	1	51	1	1	—
Gas, electricity and water .. .. .	1	1	1	1	2	1	1	1	48	1	1	—
Services .. .. .	14	10	12	15	17	12	13	14	13	13	74	—
Public administration, etc. .. .. .	—	—	—	—	—	—	—	—	—	—	—	100
Imports of goods and services .. .. .	19	5	21	29	23	11	28	19	9	5	6	—
Taxes on expenditure less subsidies .. .. .	-12	2	27	4	2	2	2	3	2	6	8	—
Total .. .. .	100	100	100	100	100	100	100	100	100	100	100	100

(1) The entry in row p (a typical row) and column q (a typical column) represents the value of the net output (plus depreciation) of industry p required to produce £100 of final output by industry q.

from abroad. Because of this, the sum of the outputs of the various industries required on average to produce £100 of final output of an industry adds to more than £100. It is also the reason why the figures in the leading diagonal in Table E and in Table 3 exceed £100. For each industry, the excess represents that part of the output of the industry sold as intermediate output to other industries to enable these other industries produce the inputs required by the industry in question.

In many ways it is more convenient to present the results given in Table E, and summarised in Table 3, in a different form so that the contribution each of the different industry groups, imports and net taxes on expenditure make to £100 of final output of each industry group adds to £100. Results presented in this way are given in Table F and summarised in Table 4. In these two tables the requirements of each industry group are measured in terms of net output (*plus depreciation*) instead of in terms of gross output. The net output (*plus depreciation*) of an industry is equal to the gross domestic income generated by the industry, and is the value of the gross output of the industry less the cost of all the goods and services used by the industry in its current production. It is often called the "value added" by the industry.

The figures in Table F are derived by applying the ratios net output (*plus depreciation*)/gross output given in row 51 of Table D to the figures for each industry group given in each of the rows of Table E<sup>(1)</sup>.

#### An example

To illustrate more clearly the relationships between Tables D, E and F, a comparison is made in Table 5 of both the direct and the indirect requirements of the Motors and cycles industry group on the outputs of other industries and on imports. The figures in columns 1 and 3 of Table 5 are taken from column 14 of Tables D and E; the figures in column 2 are obtained by difference. The figures show that indirect requirements of £100 of final output by the Motors and cycles industry group exceeded its direct requirements for 25 of the 45 industry groups.

Column 4 of Table 5 is taken from row 51 of Table D, and column 5 of Table 5 from column 14 of Table F. The figures in column 5 can be derived from column 3 by

applying to each of the figures in column 3 the ratios net output (*plus depreciation*)/gross output given in column 4. The figures in Table 5 show that, on average, 43 per cent. of the final output of the Motors and cycles industry group in 1954 represented the value added by the industry; the rest represented the contribution made by the other classes of production industries (31 per cent.); the Services industry group (13 per cent.); imports (11 per cent.); and net taxes on expenditure (2 per cent.).

#### Primary inputs

An alternative way of presenting the figures of net output (*plus depreciation*) for each industry group given in Table 4 is to analyse them by kind of income instead of by industry of origin. In the final analysis, the gross output of each industry can be reduced to its primary input content comprising income from employment, gross profits and other trading income, imports of goods and services and net taxes on expenditure. In Table 6, the primary input content of the final output of each major industry group is shown. The table shows that the domestic labour cost content of final output varies considerably from industry to industry. In 1954, labour costs represented 28 per cent. of the value of the output of the Food, drink and tobacco industry group, 59 per cent. of the output of the Engineering and allied industries group, and as much as 77 per cent. of the output of Mining and quarrying. Both Tables 4 and 6 show the import content (comprising both goods and services) of the outputs of the different major industry groups. In 1954, this varied from 5 per cent. for the Mining and quarrying and the Gas, electricity and water industry groups to about 10 per cent. for the Construction and the Engineering and allied industries and to nearly 30 per cent. for the Chemicals and allied industries and the Textiles, leather and clothing industry group.

For the more detailed industry groups, import contents (both direct and indirect) are shown in row 47 of Tables E and F in terms of merchandise imports valued c.i.f. In 1954, the merchandise import content appears to have varied from about 5 per cent. for the Coke ovens and coal tar products industry group and for the Coal mining industry to about 50 per cent. for the Oil and greases industry group.

## SUPPLEMENTARY TABLES

### Industrial composition of final expenditure

Table 7 shows the percentage contribution made towards meeting the various forms of final expenditure in 1954 by each of the major industry groups and imports. The contribution each industry makes is measured by the net output (*plus depreciation*) of the industry, or its value added. The figures in the table are thus on the same basis as those given in Table 4. They have been derived by applying the sets of coefficients for each industry in Table 4 to the detailed estimates of final expenditure on the output of each industry, on imports and on net taxes on expenditure given in columns 14 to 19 of Table 1.

The table shows, for example, that in 1954, the Mining and quarrying industries accounted for 2 or 3 per cent. of the total value of each of the various forms of final expenditure, and the Gas, electricity and water industries accounted

for 1 or 2 per cent. of each of the totals. The table also shows, for example, the contribution made towards meeting each of the various forms of final expenditure by the Engineering and allied industries in 1954. Their contribution accounted for 4 per cent. of the total value of consumers' expenditure, 12 per cent. of public authorities' current expenditure on goods and services, 24 per cent. of gross fixed capital formation at base and for 21 per cent. of the total value of exports of goods and services.

### Allocation of output

The information on which Table 7 is based is presented in a different form in Table 8. This table analyses the extent to which the different major industry groups were dependent on each of the various forms of final expenditure in 1954. It shows the size and relative importance of both the

(1) It is inherent in the nature of this calculation that the sum of the products is 100 in each case (which provides a useful check).

# Requirements per £100 of final output by the Motors and cycles industry

TABLE 5

Industry group	Direct requirements	Indirect requirements	Total requirements <sup>(1)</sup>	Net output <sup>(2)</sup> as per cent. of gross output	Total requirements <sup>(2)</sup> (net)
	£	£	£	%	£
1. Agriculture, forestry and fishing .. ..	—	0.1	0.1	56.8	0.1
2. Coal mining .. ..	0.3	2.4	2.7	71.8	1.9
3. Other mining and quarrying .. ..	—	0.6	0.6	41.3	0.2
4. Coke ovens and coal tar products .. ..	0.1	1.5	1.6	17.9	0.3
5. Chemicals and dyestuffs .. ..	0.7	1.3	2.0	43.4	0.9
6. Drugs and perfumery .. ..	—	—	—	44.8	—
7. Soap, polishes, etc. .. ..	—	0.1	0.1	28.1	—
8. Mineral oil refining .. ..	0.2	0.5	0.7	10.0	0.1
9. Oils and greases .. ..	0.1	0.3	0.4	21.4	0.1
10. Paints, plastic materials, etc. .. ..	1.7	0.4	2.1	40.1	0.8
11. Iron and steel-making, rolling and casting .. ..	11.9	3.4	15.7	40.8	6.4
12. Iron and steel—tin plates and tubes .. ..	0.6	0.3	1.0	27.4	0.3
13. Non-ferrous metals .. ..	3.8	1.7	5.2	51.7	1.6
14. Motors and cycles .. ..	—	0.4	100.4	42.6	42.7
15. Aircraft .. ..	0.2	0.1	0.3	59.4	0.2
16. Railway rolling stock etc. .. ..	—	0.4	0.4	44.2	0.2
17. Shipbuilding and marine engineering .. ..	0.1	0.3	0.4	54.9	0.1
18. Mechanical engineering .. ..	4.5	1.6	6.1	54.9	2.6
19. Electrical engineering (general) .. ..	3.0	0.6	3.6	51.9	1.8
20. Radio and tele-communications .. ..	0.3	0.6	1.1	47.2	0.5
21. Hardware and hollow-ware .. ..	2.4	0.7	3.1	43.3	1.4
22. Precision instruments, jewellery, etc. .. ..	0.2	0.1	0.3	52.6	0.2
23. Miscellaneous metal manufactures .. ..	3.8	0.8	4.6	43.1	2.4
24. Cottons and man-made fibres .. ..	0.4	1.1	1.5	38.6	0.5
25. Woollens and worsteds .. ..	0.1	0.2	0.3	30.7	0.1
26. Hosiery and lace .. ..	—	—	—	35.9	—
27. Other textiles .. ..	0.7	0.4	1.1	35.6	0.4
28. Textiles finishing and packing .. ..	—	0.2	0.2	55.3	0.1
29. Leather and fur .. ..	0.3	0.1	0.4	30.4	0.1
30. Clothing .. ..	0.1	0.1	0.2	36.6	0.1
31. Boot and shoe .. ..	—	—	—	36.7	—
32. Casual footwear .. ..	—	0.1	0.1	23.4	—
33. Other manufactured foods .. ..	—	—	—	17.9	—
34. Drink and tobacco .. ..	—	0.1	0.1	14.9	—
35. Timber and furniture .. ..	1.5	0.4	1.9	36.2	0.7
36. Paper and board .. ..	0.3	0.7	1.0	44.8	0.4
37. Printing and publishing .. ..	4.2	0.3	4.5	34.8	0.4
38. Rubber .. ..	0.3	0.2	0.5	37.2	0.1
39. Crusts and glassware .. ..	0.1	0.5	0.6	36.3	0.2
40. Building materials .. ..	0.6	0.3	0.9	43.4	0.4
41. Miscellaneous manufactures .. ..	0.3	0.7	1.0	30.9	0.5
42. Building and contracting .. ..	0.3	0.6	0.9	42.9	0.4
43. Gas and water .. ..	0.6	1.1	1.7	48.8	0.8
44. Electricity .. ..	3.1	8.8	17.9	74.1	13.8
45. Services .. ..	—	—	—	—	—
46. Public administration, etc. .. ..	—	—	—	—	—
47. Imports .. ..	2.0	0.5	2.5	—	0.5
48. Sales by final buyers .. ..	—	—	—	—	—
49. Taxes on expenditure less subsidies .. ..	0.4	1.8	2.2	—	2.2
50. Gross domestic income .. ..	42.6	—	—	—	—
Total .. ..	100	—	—	—	100

(1) In terms of gross output.

(2) Includes depreciation.

(3) In terms of net output (plus depreciation).

# Industrial output in terms of primary input in 1954

TABLE 6

Percentages

Industry group	Income from employment	Gross profits and other trading income (%)	Imports of goods and services	Taxes on expenditure less subsidies	Final output
Agriculture, forestry and fishing .. ..	45	48	19	-12	100
Mining and quarrying .. ..	77	16	5	2	100
Food, drink and tobacco .. ..	28	24	21	27	100
Chemicals and allied industries .. ..	39	38	29	4	100
Metal manufacture .. ..	47	28	23	2	100
Engineering and allied industries .. ..	39	38	11	2	100
Textiles, leather and clothing .. ..	67	23	38	2	100
Other manufacturing .. ..	52	26	39	3	100
Construction .. ..	65	24	9	2	100
Gas, electricity and water .. ..	56	33	5	6	100
Services .. ..	53	33	6	8	100
Public administration, etc. .. ..	76	34	—	—	100
Total final output .. ..	48	25	17	10	100

(1) Before providing for depreciation but after providing for stock appreciation. Includes the "residual error" in the national income accounts.

direct demands and the indirect demands made by each of the various forms of final expenditure on the outputs of each of the major industry groups. It also shows the demands made on the gross domestic product as a whole and on imports.

In deriving Table 8 it is assumed, as in other tables, that the input/output ratio for each industry is the same for all the sales by the industry. It follows that the proportion of the industry's output directly or indirectly dependent on each of the various forms of final expenditure is the same in terms of the industry's gross output and net output.

The direct demands on each industry's output shown in Table 8 are derived from the figures of gross output

given in each of the rows of Table 1. The total demands were obtained by applying the sets of coefficients for each industry given in Table 4 to the detailed figures of final expenditure given in columns 14-19 of Table 1, and are in terms of net output (plus depreciation). The indirect demands (again in terms of net output) were obtained by difference.

Row 7 of Table 1, for example, shows that consumers' expenditure on the gross output of the Textiles, leather and clothing industry group amounted to £987 million in 1954, and accounted for 55 per cent. of the output of the industry. This represents the direct demand on the industry by personal consumers and is shown as such in Table 8. The indirect demand of personal consumers on the output

## Industrial composition of final expenditure for 1954<sup>(1)</sup>

TABLE 7

Percentages

Industry group	Consumers' expenditure	Public authorities' current expenditure on goods and services	Gross fixed capital formation at home	Exports of goods and services	Total final expenditure (%)
Agriculture, forestry and fishing .. ..	6	—	—	1	4
Mining and quarrying .. ..	3	2	3	3	3
Food, drink and tobacco .. ..	4	—	—	1	3
Chemicals and allied industries .. ..	2	2	2	5	3
Metal manufacture .. ..	1	2	5	5	2
Engineering and allied industries .. ..	4	12	24	21	10
Textiles, leather and clothing .. ..	4	1	1	7	4
Other manufacturing .. ..	4	3	6	5	4
Construction .. ..	2	3	22	1	4
Gas, electricity and water .. ..	2	1	2	1	2
Services .. ..	28	15	17	29	25
Public administration, etc. .. ..	6	47	—	—	10
Imports of goods and services .. ..	20	9	12	19	17
Taxes on expenditure less subsidies .. ..	14	3	6	2	10
Total .. ..	100	100	100	100	100

(1) The contribution each industry makes to meeting the totals of final expenditure is measured by the industry's net output (plus depreciation), or its value added.

(2) Includes the value of the physical increase in stocks and work in progress.

## The allocation of output in 1954

TABLE 8

Percentages

Industry group	Intermediate output	Final output and expenditure					Total output	
		Total final output	Consumers' expenditure	Public authorities' current expenditure on goods and services	Gross fixed capital formation at home	Value of physical increases in stocks and work in progress		Exports of goods and services
Agriculture, forestry and fishing:								
Direct demand ..	46	54	51	3	—	1	2	100
Indirect demand ..	—46	46	43	—	—	—	4	—
Total ..	—	100	94	3	—	1	6	100
Mining and quarrying:								
Direct demand ..	74	26	17	2	2	—1	7	100
Indirect demand ..	—74	74	40	8	11	—	14	—
Total ..	—	100	57	10	13	—1	21	100
Food, drink and tobacco:								
Direct demand ..	9	91	86	—	—	—	5	100
Indirect demand ..	—9	9	9	—	—	—	—	—
Total ..	—	100	95	—	—	—	5	100
Chemicals and allied industries:								
Direct demand ..	56	44	14	7	—	2	21	100
Indirect demand ..	—56	56	31	5	10	—	10	—
Total ..	—	100	45	12	10	2	31	100
Metal manufacturing:								
Direct demand ..	81	19	1	1	2	1	14	100
Indirect demand ..	—81	81	24	12	24	—	21	—
Total ..	—	100	25	13	26	1	35	100
Engineering and allied industries:								
Direct demand ..	22	78	9	15	25	—	29	100
Indirect demand ..	—22	22	12	2	3	—	5	—
Total ..	—	100	21	17	28	—	34	100
Textiles, leather and clothing:								
Direct demand ..	13	87	55	3	—	3	25	100
Indirect demand ..	—13	13	6	1	3	—	4	—
Total ..	—	100	61	4	3	3	29	100
Other manufacturing:								
Direct demand ..	57	43	25	4	2	2	10	100
Indirect demand ..	—57	57	26	6	15	—	10	—
Total ..	—	100	51	10	17	2	20	100
Construction:								
Direct demand ..	13	87	34	11	63	—1	—	100
Indirect demand ..	—13	13	9	1	—	—	3	—
Total ..	—	100	23	12	63	—1	3	100
Gas, electricity and water:								
Direct demand ..	47	53	29	5	9	—	—	100
Indirect demand ..	—47	47	26	5	6	—	10	—
Total ..	—	100	55	10	15	—	10	100
Services:								
Direct demand ..	30	70	48	6	4	—	12	100
Indirect demand ..	—30	30	16	3	5	—	6	—
Total ..	—	100	64	9	9	—	18	100
Public administration, etc.:								
Direct demand ..	—	100	32	68	—	—	—	100
Gross domestic product (i.e. all above industries)	—	100	30	18	14	—	18	100
Imports of goods and services:								
Direct demand ..	65	35	27	3	2	—1	4	100
Indirect demand ..	—65	65	39	5	7	—	14	—
Total ..	—	100	66	8	9	—1	18	100

# The proportion of output exported in 1954

TABLE 9

Percentages

Industry group	Direct	Indirect	Total
1. Agriculture, forestry and fishing .. .. .	2	2	4
2. Coal mining .. .. .	7	14	21
3. Other mining and quarrying .. .. .	6	17	23
4. Coke ovens and coal tar products .. .. .	6	31	37
5. Chemicals and dyes .. .. .	24	16	40
6. Drugs and perfumery .. .. .	30	1	31
7. Soap, polishes, etc. .. .. .	11	4	15
8. Mineral oil refining .. .. .	27	13	39
9. Oils and greases .. .. .	5	12	17
10. Paint, plastic materials, etc. .. .. .	16	14	30
11. Iron and steel—rolling, rolling and castings .. .. .	9	27	36
12. Iron and steel—in plate and tubes .. .. .	32	12	44
13. Non-ferrous metals .. .. .	14	21	35
14. Motors and cycles .. .. .	37	3	40
15. Aircraft .. .. .	16	2	18
16. Railway rolling stock, etc. .. .. .	18	9	27
17. Shipbuilding and marine engineering .. .. .	19	5	24
18. Mechanical engineering .. .. .	29	7	36
19. Electrical engineering (general) .. .. .	12	9	21
20. Radio and tele-communications .. .. .	14	6	20
21. Hardware and hollow-ware .. .. .	12	12	24
22. Precision instruments, jewellery, etc. .. .. .	31	10	41
23. Miscellaneous metal manufactures .. .. .	21	19	40
24. Cotton and man-made fibres .. .. .	26	10	36
25. Woollens and wovens .. .. .	33	6	39
26. Hosiery and lace .. .. .	13	1	14
27. Other textiles .. .. .	25	7	32
28. Textile finishing and packing .. .. .	—	35	35
29. Leather and fur .. .. .	13	7	20
30. Clothing .. .. .	5	—	5
31. Boot and shoe .. .. .	1	—	1
32. Cereal foodstuffs .. .. .	6	2	8
33. Other manufactured foods .. .. .	5	—	5
34. Drink and tobacco .. .. .	5	—	5
35. Timber and furniture .. .. .	1	8	9
36. Paper and board .. .. .	9	14	23
37. Printing and publishing .. .. .	6	11	17
38. Rubber .. .. .	16	16	32
39. Glass and glassware .. .. .	25	9	34
40. Building materials .. .. .	6	6	12
41. Miscellaneous manufactures .. .. .	24	8	32
42. Building and contracting .. .. .	—	3	3
43. Gas and water .. .. .	1	9	10
44. Electricity .. .. .	—	12	12
45. Services .. .. .	13	6	19
46. Public administration, etc. .. .. .	—	—	—
Gross domestic product (i.e. all above industries) .. .. .	—	—	18

of the industry is shown in Table 8 as equal to 6 per cent. of the value of the output of the industry. This represents that part of the intermediate output of the Textiles, leather and clothing industry group (shown in Table 1) which is ultimately but not directly dependent on consumers' expenditure. Thus, textiles are bought, for example, by the Engineering and allied industries and are incorporated in products sold by these industries to persons, or in the products of other industries using the products of the engineering industries, which in their turn are eventually sold to personal consumers.

Table 8 also shows, for example, that consumers' expenditure directly accounted for 39 per cent. of the output of the Gas, electricity and water industries in 1954, and indirectly for a further 26 per cent. Thus in total, it

accounted for two thirds of the industry group's output. Similarly, whereas consumers' expenditure was directly responsible for a negligible proportion of the output of the Metal manufacture industry group in 1954, indirectly it was responsible for a quarter of its output.

## Proportion of output exported

Table 9 analyses in greater detail the information about the proportion of output exported in 1954 given in Table 8. The proportion of the gross output of each industry exported directly by each of the 46 industry groups is obtained by relating the figures of exports analysed by commodity group in column 48 of Table 8 to the figures of gross output for each corresponding industry group in column 49 of Table A<sup>(1)</sup>.

<sup>(1)</sup> This comparison is not strictly correct because the figures of gross output for each industry in Table A exclude the principal products of the industry produced by other industries, and include for each industry its output of secondary products which are different to the results of this comparison. The analysis given in Table 2, however, shows that in practice this inaccuracy makes little difference to the results of this comparison.

# Final output in terms of primary input in 1954

TABLE 10

Percentages

Final output Primary input	Consumers' expenditure	Public authorities' current expenditure on goods and services	Gross fixed capital formation at home	Exports of goods and services	Total final output and expenditure <sup>(1)</sup>
Income from employment	38	74	57	53	48
Gross profits and other trading income <sup>(2)</sup>	38	14	25	28	25
Imports of goods and services	20	9	13	19	17
Taxes on expenditure less subsidies	14	2	6	2	10
Total	100	100	100	100	100

<sup>(1)</sup> Includes the value of the physical increase in stocks and work in progress.

<sup>(2)</sup> Before providing for depreciation but after providing for stock appreciation. Includes the "residual error" in the national income accounts.

Total exports (both direct and indirect) were derived by applying the sets of coefficients given for each industry group in Table F to the figures of exports in each commodity group given in Table B. The figures of total exports for each industry group were then expressed as a proportion of the net output (after depreciation) of each industry group. The proportion of output indirectly exported by each industry was obtained as the difference between the proportion exported directly and the proportion exported in total. These indirect exports represent that part of the intermediate output of each industry embodied, as it were, in the exports of other industries. For example, indirect exports of coal include the coal used by the iron and steel and the engineering industries in producing exports of engineering products, and the coal used by the textile industries in producing piece goods which in turn are sold to the clothing industries which manufacture clothing for export<sup>(3)</sup>.

The table shows that the importance of indirect exports varied considerably from one industry group to another. As would be expected, it was generally more important for those industries producing mainly intermediate products for use by other industries. Indirect exports exceeded one-fifth of total output for the Coke ovens and coal tar products industry group, the Iron and steel—milling, rolling and castings industry group, and for the Non-ferrous metals industry group. The table also shows, for example, that the value of indirect exports of coal were twice as big as direct exports of coal in 1954, indirect exports of iron and steel—milling, rolling and castings

products were three times as important as direct exports and that about one eighth of the output of the Electricity industry was indirectly exported. For the economy as a whole, 18 per cent. of the gross domestic product was exported in 1954.

## Final output in terms of primary input

Table 10 sets out estimates of the primary input content of each of the various forms of final expenditure in 1954. The figures were derived by analysing each of the various forms of final expenditure, not by industry of origin as in Table 7, but by type of income. The table shows that the import content of final expenditure varied in 1954 from about one tenth for public authorities' current expenditure on goods and services to one eighth for gross fixed capital formation at home and to about one fifth for both consumers' expenditure and for exports of goods and services. If imports of goods which are directly exported without processing in the United Kingdom are excluded from the figures (these are shown in row 13 of column 18 of Table 1), the import content of exports of goods and services in 1954 is reduced from 19 per cent. to 15 per cent. The import content here relates to imports of goods and services on a balance of payments basis as used in national income statistics.

The merchandise import content (valued c.i.f.) of exports may be derived by applying the coefficients in row 47 of Table F to the figures of exports by commodity given in column 48 of Table B. In 1954 the merchandise import content of United Kingdom exports of merchandise was 17 per cent.

<sup>(3)</sup> It may be noted that the earnings of building contractors operating overseas are regarded as direct exports of the Services industry group and not as exports of the Building and contracting industry. This corresponds to the practice followed in balance of payments and national income statistics.

# Final output in terms of primary input, 1948 to 1959

TABLE II

Percentage

	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
Income from employment .. ..	49	49	48	46	47	47	48	48	49	49	50	50
Gross profits and other trading income <sup>(1)</sup> ..	25	25	24	23	24	25	25	24	23	24	24	24
Imports of goods and services .. ..	14	15	14	12	13	17	17	18	18	17	16	16
Taxes on expenditure less subsidies .. ..	10	10	10	10	10	10	10	10	10	10	10	10
Residual error <sup>(2)</sup> .. ..	—	—	—	—	1	1	—	—	—	—	—	—
Total final output .. ..	100	100	100	100	100	100	100	100	100	100	100	100

(1) Before providing for depreciation but after providing for stock appreciation.

(2) This is the "residual error" in the national income accounts.

In 1954, domestic labour costs accounted for about two fifths of consumers' expenditure, one half of exports of goods and services, three fifths of gross fixed capital formation at home and for three-quarters of public authorities' current expenditure on goods and services<sup>(3)</sup>.

Table II sets out the primary input content of total final output for each year over the period 1948 to 1959<sup>(4)</sup>. It shows that the percentage cost composition has remained remarkably stable over the period in spite of an increase of fifty per cent. in final output prices.

(3) It may be noted that the percentages given in Table 10 for the year 1954 are little different from the corresponding percentages for the year 1950 given in Table 23 of *National Income and Expenditure, 1951*.

(4) These percentages are derived from Table 9 of *National Income and Expenditure, 1960*.

## SOURCES AND METHODS

This Appendix summarises the sources and methods used in compiling Tables A, B and C and Table 1. The main single source of information used was the Census of Production for 1954, but considerable use was also made of other published and unpublished material. These include the *Annual Statement of Trade of the United Kingdom*, the detailed estimates of agricultural output and input prepared by the Ministry of Agriculture, Fisheries and Food in connection with their estimates of farmers' income, the *Estimates, the Appropriation Accounts and the accounts of the National Health Service*. Considerable use was also made of the detailed estimates of income and expenditure given in *National Income and Expenditure, 1960*, H.M.S.O., 1960 (subsequently referred to as the National Income Blue Book for 1960).

## General methods

Work on compiling the detailed input-output flow table (Table A) was divided into four main parts. First, the total value of the supplies, from both home production and imports, of each of 44 groups of commodities was estimated. The results of this analysis are set out in Table C. Second, the total value of the goods and services purchased by each industry was estimated and classified by commodity group. The results are set out in Table B. This stage of the work was carried out in considerable detail and estimates of purchases classified by commodity group were made for each of the 150 separate industries covered by the Census of Production for 1954. They were made, for example, for the cotton spinning and doubling industry, the cotton weaving industry, the textile converting industry and the rayon production and weaving industries—all of which together comprise the Cotton and man-made fibres industry group. Third, the estimates of the total supplies of each commodity group and of the total purchases by each of the various industry groups were reconciled with one another, and also with independent figures of exports and stock changes and with largely independent estimates of other forms of final demand. In this stage of the work numerous adjustments were made to the original estimates of purchases classified by commodity group, and also to the estimates of total supplies, so as to make the estimates of demand and supply for each commodity group, as far as possible, consistent. Fourth, the inter-industry flow table (Table A) was derived by switching the classification of purchases from a commodity basis on to an industry basis. In most cases this was done automatically (with the help of an electronic computer) by assuming that purchases of each commodity group could be divided up according to the analysis of supplies in each of the rows in Table C. For imports and customs duties and for certain industries (e.g. Agriculture, forestry and fisheries, Mining and

quarrying and Non-ferrous metals) it was done in a more refined manner by referring back to detailed work sheets.

The paragraphs below describe in more detail the sources and methods used.

## Agriculture, forestry and fishing

The value of agricultural output and input are based on Ministry of Agriculture estimates for crop years ending in May. The figures for the calendar year 1954 were obtained by taking five-twelfths of the figures for 1953-54, and seven-twelfths of the figures for 1954-55. This follows the practice adopted in the National Income Blue Book. The figures relate to all holdings, including those of under one acre. Summary details of the inputs into agriculture are given, for example, in Table 211 of the *Annual Abstract of Statistics*, No. 95, 1959. The commodity composition and the industry of origin of these inputs was based partly on these data and partly on information relating to output (e.g. fertilisers and feeding stuffs) given in the Census of Production, and partly on information relating to imports given in the *Annual Statement of Trade of the United Kingdom*.

The estimates of output and input into forestry and fishing are very rough. Information about the value of the fish landed from British fishing vessels is published in the *Annual Abstract of Statistics*, but there is little or no information available about the purchases made by the fishing and forestry industries.

## Mining, manufacturing, building, gas, electricity and water industries

Mining and quarrying, manufacturing, building and contracting and the gas, electricity and water industries were all covered by the Census of Production for the year 1954, which gives information about their input and output in considerable detail. The Census gives for each industry details of its sales of principal products and of its sales of principal products of other industries (i.e. secondary products). Table C provides an analysis of the industries producing various commodity groups, and is based on the Census of Production. There are some commodities which are not regarded in the Census as principal products of any industry, e.g., waste products, heat and steam sold. In Table C, such products are treated as principal products of the industry which sells them. An exception to this is scrap metal sold, which is treated as a principal product of the Iron and steel-metallurgy and casting industry group in the case of iron and steel scrap, and of the Non-ferrous metals industry group in the case of non-ferrous metal scrap. Building and construction work carried out on their own account by firms in industries other than the building and contracting industry itself is also treated as a principal product of

the industry in which the work is done. A considerable amount of building work is carried out by direct labour by the gas, electricity and water industries and by firms in the transport and communication industry.

The detailed figures of materials purchased given in the Census of Production for 1954 relate only to firms employing eleven or more persons, and allowance has been made for the purchases by smaller firms and by firms which failed to make satisfactory returns in the Census.

Not all materials purchased are shown separately in the Census; a varying proportion are shown as "unclassified

materials purchased" and as "all other purchased materials". Furthermore, an investigation of actual returns made in the Census showed that in many cases firms had returned materials under the "all other purchased material" heading instead of specifying them separately or as unclassified. An indication of the importance of purchases of "unclassified" and "all other" materials by firms employing over ten persons and of the total purchases of materials and fuel by small firms and by firms not making satisfactory returns is given in the following table.

### Analysis of purchases of materials and fuel

Industry group	Total value of materials and fuel purchased (at purchaser's price)	Value of unclassified materials purchased		
		Total	"All other" and unclassified purchases of materials by large firms <sup>(1)</sup>	Total purchases of materials and fuel by small firms, etc. <sup>(2)</sup>
	£ million	Percentage of total value of materials and fuel purchased		
1. Coal mining .. .. .	145	21	21	—
2. Other mining and quarrying .. .. .	32	93	29	10
3. Coke ovens and coal tar products .. .. .	136	5	4	1
4. Chemicals and dyes .. .. .	300	32	30	2
5. Drugs and perfumery .. .. .	78	35	32	3
6. Soap, polishes, etc. .. .. .	78	14	10	4
7. Mineral oil refining .. .. .	265	1	1	—
8. Oil and greases .. .. .	134	13	36	3
9. Paints, plastic materials, etc. .. .. .	133	26	23	3
10. Iron and steel—rolling, rolling and castings .. .. .	837	7	5	2
11. Iron and steel—in plate and tubes .. .. .	113	8	7	1
12. Non-ferrous metals .. .. .	458	10	7	1
13. Motors and cycles .. .. .	647	24	23	1
14. Aircraft .. .. .	139	18	18	—
15. Railway rolling stock, etc. .. .. .	115	13	12	1
16. Shipbuilding and marine engineering .. .. .	878	17	15	2
17. Mechanical engineering .. .. .	824	26	17	3
18. Electrical engineering (general) .. .. .	229	24	22	2
19. Radio and tele-communications .. .. .	249	13	23	—
20. Hardware and hollow-ware .. .. .	145	29	12	8
21. Precision instruments, jewellery, etc. .. .. .	130	32	27	5
22. Miscellaneous metal manufactures .. .. .	140	16	8	8
23. Cotton and man-made fibres .. .. .	719	3	2	1
24. Woollen and worsted .. .. .	434	3	1	2
25. Hosiery and lace .. .. .	138	5	3	1
26. Other textiles .. .. .	260	21	16	2
27. Textile finishing and packing .. .. .	38	13	10	3
28. Leather and fur .. .. .	102	15	6	9
29. Clothing .. .. .	292	11	7	4
30. Foot and shoe .. .. .	94	10	9	1
31. General foodstuffs .. .. .	664	22	4	18
32. Other manufactured foods .. .. .	1,311	11	6	5
33. Drink and tobacco .. .. .	1,473	3	1	2
34. Textiles and furniture .. .. .	258	25	9	16
35. Paper and board .. .. .	287	7	6	1
36. Printing and publishing .. .. .	148	17	9	7
37. Rubber .. .. .	133	11	9	2
38. China and glassware .. .. .	55	18	15	3
39. Building materials .. .. .	127	22	34	8
40. Miscellaneous manufactures .. .. .	109	25	39	6
41. Building and contracting .. .. .	782	65	43	22
42. Gas and water .. .. .	183	13	11	1
43. Electricity .. .. .	189	14	24	—
Total .. .. .	12,765	17	12	5

(1) I.e. By firms employing eleven persons or more. Unclassified purchases of fuel and of particular groups of commodities (e.g. "other packing materials", "other component parts", and "other iron and steel", etc.) are not included.

(2) Enterprises purchased by firms employing fewer than 11 persons and firms not making satisfactory returns in the Census.

the industry in which the work is done. A considerable amount of building work is carried out by direct labour by the gas, electricity and water industries and by firms in the transport and communication industry.

The detailed figures of materials purchased given in the Census of Production for 1954 relate only to firms employing eleven or more persons, and allowance has been made for the purchases by smaller firms and by firms which failed to make satisfactory returns in the Census.

Not all materials purchased are shown separately in the Census; a varying proportion are shown as "unclassified

materials purchased" and as "all other purchased materials". Furthermore, an investigation of actual returns made in the Census showed that in many cases firms had returned materials under the "all other purchased material" heading instead of specifying them separately or as unclassified. An indication of the importance of purchases of "unclassified" and "all other" materials by firms employing over ten persons and of the total purchases of materials and fuel by small firms and by firms not making satisfactory returns is given in the following table.

### Analysis of purchases of materials and fuel

Industry group	Total value of materials and fuel purchased (at purchaser's price)	Value of unclassified materials purchased		
		Total	"All other" and unclassified purchases of materials by large firms <sup>(1)</sup>	Total purchases of materials and fuel by small firms, etc. <sup>(2)</sup>
	£ million	Percentages of total value of materials and fuel purchased		
2. Coal mining .. .. .	145	21	21	—
3. Other mining and quarrying .. .. .	32	33	23	10
4. Coke ovens and coal tar products .. .. .	126	5	4	1
5. Chemicals and dyes .. .. .	300	32	30	2
6. Drugs and perfumery .. .. .	78	35	32	3
7. Soap, polishes, etc. .. .. .	78	14	10	4
8. Mineral oil refining .. .. .	265	1	1	—
9. Oils and greases .. .. .	155	13	10	3
10. Paint, plastic materials, etc. .. .. .	223	26	23	3
11. Iron and steel—rolling, rolling and castings .. .. .	857	7	5	2
12. Iron and steel—in plate and tubes .. .. .	323	8	7	1
13. Non-ferrous metals .. .. .	418	10	7	3
14. Motors and cycles .. .. .	647	24	23	1
15. Aircraft .. .. .	159	18	18	—
16. Railway rolling stock, etc. .. .. .	115	13	12	1
17. Shipbuilding and marine engineering .. .. .	178	17	15	2
18. Mechanical engineering .. .. .	624	20	17	3
19. Electrical engineering (general) .. .. .	229	24	22	2
20. Radio and tele-communications .. .. .	240	23	23	—
21. Hardware and hollow-ware .. .. .	185	20	22	8
22. Precision instruments, jewellery, etc. .. .. .	130	32	27	5
23. Miscellaneous metal manufactures .. .. .	180	16	8	8
24. Cotton and man-made fibres .. .. .	739	3	2	1
25. Woolles and worsteds .. .. .	404	3	1	2
26. Hosiery and lace .. .. .	129	5	3	2
27. Other textiles .. .. .	261	21	16	5
28. Textile finishing and packing .. .. .	38	13	10	3
29. Leather and fur .. .. .	102	15	6	9
30. Clothing .. .. .	292	11	7	4
31. Boots and shoes .. .. .	94	10	9	1
32. Cereal foodstuffs .. .. .	664	22	4	18
33. Other manufactured foods .. .. .	1,130	11	6	5
34. Drink and tobacco .. .. .	1,173	3	1	2
35. Timber and furniture .. .. .	258	25	9	16
36. Paper and board .. .. .	287	7	6	1
37. Printing and publishing .. .. .	148	17	10	7
38. Rubber .. .. .	133	11	9	2
39. China and glassware .. .. .	55	25	15	3
40. Building materials .. .. .	177	22	14	8
41. Miscellaneous manufactures .. .. .	399	21	19	6
42. Building and contracting .. .. .	782	45	43	22
43. Gas and water .. .. .	883	12	11	1
44. Electricity .. .. .	189	14	14	—
Total .. .. .	12,705	17	12	5

(1) i.e. by firms employing eleven persons or more. Unclassified purchases of fuel and of particular groups of commodities (e.g. "other packing materials", "other component parts", and "other iron and steel", etc.) are not included.

(2) Comprises purchases by firms employing fewer than 11 persons and firms not making satisfactory returns in the Census.

The table shows that the degree of estimation varied considerably, from as much as 65 per cent. for the Building and contracting industry to as little as 3 per cent. for the Woollen and worsted and the Drink and tobacco industry groups and 1 per cent. for the Mineral oil refining industry.

Materials classified as "all other purchased materials" were all allocated to one or more of the commodity groups. In the minority of cases where the amounts involved were small, they were allocated on a *pro rata* basis over the headings shown in the Census, after making some allowance for purchases of stationery, office materials, packing materials, etc., which are common to all industries. In the other cases where the amounts involved were large, an indication of the nature of the materials purchased was obtained by selecting a sample of the actual returns made by the larger establishments which gave further details of purchases than were tabulated in the census reports. In some cases an indication of the purchases included under "all other purchased materials" was obtained from the nature of the output data for the industry given in the Census. Unclassified materials purchased and purchased by firms employing less than eleven persons and by firms making unsatisfactory returns were allocated on a *pro rata* basis over the estimated detailed purchases of firms employing over ten persons.

Even where the value of particular materials purchased are shown separately in the Census, it is not always possible to know to which commodity group the material purchased belongs. For example, coke is regarded in the Census as a principal product in both the Coke ovens industry and in the Gas industry. Also, unfinished parts of iron and steel are produced as principal products by several industries besides the iron and steel industries themselves, for example the Hardware and hollow-ware industry and the Miscellaneous metals industry.

In some cases materials purchased, which are the products of several different industries are shown in the Census under general headings. Examples of such general headings are—"consumable tools", "packing materials" and "replacement parts for plant, machinery and vehicles". Consumable tools are principal products of the Miscellaneous metal manufactures industry and of the Mechanical engineering industry. Replacement parts for plant, machinery and vehicles are principal products of most of the engineering industries and of the Rubber industry (for tyres). Packing materials are principal products of the "Other textiles" industry (sacks); the Hardware and hollow-ware industry (cans), the Paper and board industry (paper, bags, sacks); the China and glassware industry (bottles) and the Timber and furniture industry (crates, packing cases). These general headings were allocated to commodity groups partly by referring to figures for other industries where separate details of purchases are shown, partly by looking at the nature of the industry's output, and, in the case of replacement parts for machinery, etc., by referring to the division of gross fixed investment between plant, machinery and vehicles given in the Census for each industry.

A further complication is that from the point of view of a producer a commodity may be regarded as a finished product, but from the point of view of a buyer it is an unfinished product and may be recorded as such in the Census table of materials purchased. In the Census the headings in the input tables do not always correspond with the headings in the output tables. Also, the headings

in the *Annual Statement of Trade of the United Kingdom* for imports and exports of merchandise do not always accord precisely with the headings used in the Census of Production.

The following paragraphs describe special points of treatment not covered by the general description given above.

**Coal mining.** The value of the gross output of the coal mining industry, as recorded in the Census, has been increased by £29 million to include the value of open cast coal mined, and by another £16 million to include the commercial value of coal sold to miners at concessionary prices or given to them free.

**Building and contracting.** Estimates of expenditure on building repairs by manufacturing industries are not given in the Census of Production for 1954; they were, however, given in the Census for 1948. The figures of expenditure on building repairs by manufacturing industries given in Tables A and B and in Table 1 are rough estimates based on the figures for 1948. Sales by the Building and contracting industry to the Coal mining industry include £19 million for open cast mining work. Purchases by the Building and contracting industry are not shown in much detail in the Census, hence the estimates of its purchases are not as reliable as those for manufacturing industries. They are based to a large extent on information about output given for other industries; thus the estimate of purchases of building materials in row 40 of column 42 of Table B is obtained as a residue being equal to the total supply of building materials less the estimated purchases by other industries and by final buyers. Similarly, the output (less exports) of builders' woodwork produced by the Timber industry is allocated to the Building and contracting industry.

**Oils and greases and Other manufactured foods.** During 1954 a considerable amount of work was done on commission by firms in the Seed crushing industry and in the Margarine industry for the Ministry of Food. This work is recorded in the Census in terms of the amounts received for work done on commission on materials supplied. The selling value of the products is not included in the Census. An addition was, therefore, made to the Census figures of both output and input to include the estimated value of the materials used.

**Precious instruments, jewellery, etc.** Sales by the Precious metals refining industry of refined gold bullion other than that used by industry (e.g. by the Precision instruments industry and the Watch and clock manufacturing industry) are treated as sales to stock and are included in row 22 of column 47 of Table A. Purchases of gold for refining are treated as purchases from stock and are included in row 50 of column 22 of Table A. Exports and imports of gold are excluded from all the tables as they are regarded as monetary transactions.

**Coke.** The Census does not distinguish between purchases of hard coke and gas coke. The former is produced by coke ovens and the latter by gas undertakings. The division of purchases between the two is based on figures published in the *Ministry of Power Statistical Digest*, which show for broad industry groups the purchases of the two different types of coke.

**Textile finishing and packing industry.** The value of the work done by the Textile finishing industry, as recorded in the Census, is greater than the estimated amounts paid for work given out by the textile industries to the Textile

finishing industry. The difference, representing work done for merchants, etc., not included in the Census, was added to the value of the purchases by the textile industries and to the value of their output. The amounts involved were £17 million for the Cotton and man-made fibres industry; £10 million for the Woollen and worsted industry and £3 million for the "Other textiles" industry.

#### Services industry

Purchases by the Services industry group are in all cases no more than rough estimates. In some cases the estimates are derived as the residual item in the rows of Table B. That is to say, they represent the difference between the value of the total supply of the commodity group in question on the one hand, and the purchases by other industries and by final buyers on the other. This is the case, for example, for purchases by the Services industry group of coal, gas, electricity, petroleum products, paper and printing, and of building repairs. In other cases the estimates of purchases are based on information about the nature of output given in the Census of Production. Examples are purchases from the Motors and cycles industry and the Railway rolling stock, etc., industry and from the Shipbuilding and marine engineering industry. In some other cases the purchases are based on figures given in the published accounts of the nationalised industries.

The gross output of the Services industry group is obtained by adding the estimated purchases from other industries and imports and net taxes on expenditure to the estimate of gross domestic income arising in the industry group.

The sales of the Services industry group to other industries are also rather rough estimates based on scanty information. They are of two kinds—sales of direct services, e.g., advertising, postal charges, etc., and the transport and distribution margins on goods bought (including those bought from establishments within the same industry group). In Table A, the sales of the Services industry group exclude the United Kingdom insurance and freight element on imported goods; this is included in the figures of imports of merchandise valued c.i.f. (row 47) and as a negative item in row 48 of column 45. In Table 1, on the other hand, the United Kingdom insurance and freight element on imports is included in the output of the Services industry group, and only the foreign exchange cost is shown in the row for imports.

#### Public administration, etc.

This group of industries consists of the following:

	Gross domestic income (£m.)
Public administration and defence ..	986
Public health and educational services ..	508
Ownership of dwellings ..	533
Domestic services to households ..	95
Services to private non-profit-making bodies serving households ..	73
	2,195

The source of these figures, as well as comparable figures for more recent years, is Table 10 of the National Income Blue Book for 1960.

#### Consumers' expenditure

The estimates of consumers' expenditure included in column 48 of Table A and in column 14 of Table 1 are consistent with those published in the National Income Blue Book for 1960. The estimates are obtained partly by working back from the estimates of consumers' expenditure by commodity group given in the Blue Book, and partly from output data. It is not possible to provide reasonably reliable figures of consumers' expenditure for all of the forty-four commodity groups.

#### Public authorities' current expenditure on goods and services

The estimates are consistent with those published in the National Income Blue Book for 1960. Although it is possible to provide a breakdown of public authorities' expenditure by broad commodity group, e.g., it is possible to estimate how much was spent on textiles and clothing and how much on the products of the Engineering and allied industries, it is not possible to provide reasonably reliable estimates of how much was spent on the detailed list of commodity groups given in Table B. In particular, it is not possible to say how much of the output of each of the engineering industries was bought by public authorities on current account for purposes of military defence and how much was bought on capital account by industry.

#### Gross fixed capital formation at home

The figures of gross fixed capital formation at home are consistent with those published in the National Income Blue Book for 1960.

#### Exports and imports

The detailed figures of exports given in column 48 of Table B and in column 18 of Table 1 are based on an analysis of the figures of United Kingdom exports given in the *Annual Statement of Trade of the United Kingdom*. But the totals are on a balance of payments basis. The difference in timing (£5 million) between exports on a trade basis and exports on a balance of payments basis is regarded as a sale by final buyers to stocks. Exports are valued, as far as possible, at sellers' prices; a more or less arbitrary deduction is made to the f.o.b. value to convert them to this basis. The difference between the f.o.b. value and the sellers' price is regarded as an export by the Services industry group. Exports by the Services industry group also include direct exports of services (e.g. the foreign currency earnings of shipping and insurance). The figures of exports in column 48 of Table B exclude re-exports of imports. The figures of exports in column 18 of Table 1 and in column 48 of Table A relate to total exports of goods and services, including re-exports; they are thus in total the same as those published in the National Income Blue Book for 1960.

The detailed figures of imports given in column 46 of Table C and in row 47 of Table A are based on an analysis of the figures given in the trade statistics. The figures in Table C relate to retained imports, but exclude imports from British Whale Fisheries (£5 million) which are regarded as part of the output of the Fisheries industries and are included in Agriculture, forestry and fishing. The figures given in row 47 of Table A relate to total imports, including those subsequently re-exported (included in column 48). The figures of imports of goods and services given in row 13 of Table 1 are on the same basis as those given in the National Income Blue Book; they

relate to imports of merchandise valued f.o.b. plus imports of services.

#### Investment in stocks

The estimates of stock changes of materials and fuel given in row 50 of Table A and row 48 of Table B are based on information given in the Census of Production. The estimates of stocks given in column 47 of Table 1 and column 49 of Table B are based on information given in the Census and in the National Income Blue Book and also on unpublished information. The figures in column 47 of Table A represent the change in the value of the stocks of goods produced by the various industry groups or imported. They cover stocks on hand for sale and work in progress held by manufacturers, and stocks held by wholesalers and retailers, or by the Government (for trading or strategic purposes). The figures are in most cases very uncertain.

#### Gross domestic income

The estimates of gross domestic income given in row 52 of Table A and row 50 of Table B are based on information given in the Census and in the National Income Blue Book. Generally, the estimates for total manufacturing and for all the other industries outside manufacturing are based on information published in the National Income Blue Book or available on work sheets used in compiling the national income estimates.

The breakdown of gross domestic income within manufacturing industry is based on estimates of net output given in the Census of Production. The Census definition of net output is not quite the same as gross domestic income as it represents the amount left after taking from the value of gross output the aggregate of the cost of materials and fuel used and the amount paid for work given out and for any transport payments made. It is not therefore a "clean" concept. The estimates in Tables A and B were made in two stages. First, estimates were made of expenditure on direct services such as advertising, hire of machinery, and on repairs to plant, machinery and buildings and on local rates which are all included in the Census definition of net output and which were all specified separately in the Census for 1948 but not in the Census for 1954. The estimates were generally made by assuming that the expenditure on these items increased by the same proportion as the increase in net output from 1948 to 1954. Secondly, the residual difference between the resultant adjusted net output figure and the net output figure for manufacturing given in the National Income Blue Book for 1960 was allocated *pro rata* over the adjusted census figures. This difference was added to the industry's purchases of the output of the Services industry, group.

#### Net taxes on expenditure less subsidies

The figures of taxes on expenditure and subsidies relate to the calendar year 1954 and are the same as those published in the National Income Blue Book for 1960. All taxes on expenditure less subsidies are included in row 51 of Table A and row 16 of Table 1. Row 45 of Table B excludes customs duties as they are included in the sellers' price of the goods purchased. (Total supply

in column 48 of Table C, which includes customs duties on imports, is equal to the total supply in column 51 of Table B).

#### "Unallocated" row and column

In Tables A and B all sales are allocated to purchasers and all purchases are allocated back to sellers. There is no "unallocated" margin shown either as a row or as a column.

When the estimates of sales and purchases were first prepared there was in almost every case a difference between the estimated total supply and the estimated total demand for each commodity group. But it was always possible to adjust the first estimates in order to make total demand (as given in column 51 of Table B) match total supply (as given in column 48 of Table C). This was done mostly by reviewing the original estimates of purchases by industry (especially those included under "all other purchased materials") and by final buyers, and partly by reviewing the, for the most part arbitrary, margin representing the difference between sellers' prices and purchasers' prices.

This process of reviewing original estimates was a lengthy one, but it was a very valuable one as it brought to light errors of allocation that might have otherwise escaped detection.

From the point of view of the user of input-output tables it is better not to have an "unallocated" row or column as it makes the handling of the input-output tables (including the inversion and supplementary tables) rather more complicated.

The "residual error" referred to in footnote (\*) of Table 1 is something different. It is the difference in the national income accounts between largely independent estimates of the gross domestic product based on income data and on expenditure data.

#### The year 1954

The year 1954 was chosen as the year to which the input-output tables should relate because it is the latest year for which detailed information is available from the Census of Production about both sales and purchases. The only other post-war year for which such information is available is 1948.

The year 1954, as it happens, is rather a good year for studying input-output relations as prices were relatively stable during the year and stock changes were with few exceptions small. The difference between the highest and lowest monthly levels of the index of wholesale prices of basic materials used in non-food manufacturing industry was only four per cent., and output prices of manufacturing industry rose less than two per cent. during the year.

The data in the tables relate in principle to the calendar year 1954. But in practice much of the basic source material is not available for this time period. This is an important potential source of error. Information from the Census of Production for 1954, though predominantly relating either to the calendar year or to a business year close to it, could relate to a year ending anywhere between 6th April, 1954 and 5th April, 1955. Also, the data on agriculture relate to an average of two crop years ending in May.

## APPENDIX B

### GLOSSARY

#### *Commodity group*

A commodity group covers all those goods produced as *principal products* by the industry group to which it corresponds, *plus* those goods produced as *secondary products* by other industries and *competitive imports*. *Non-competitive imports* are classified to the commodity group corresponding to the industry group which would produce them as a *principal product* in their country of origin.

The commodity groups together comprise the products of agriculture, forestry and fishing, and of the industries covered by the census of production.

#### *Competitive and non-competitive imports*

Competitive imports are imports of those goods which are also produced in this country (e.g., wheat, pig iron, steel, etc.); non-competitive imports are imports of those goods which are not also produced in this country (e.g. tobacco, raw cotton, rubber, crude oil, etc.).

#### *Consumers' expenditure*

This is expenditure on goods and services by persons and by non-profit-making bodies serving persons. All business expenditure by persons is excluded.

#### *Depreciation*

This is a measure of the amount of fixed capital assets used up in the process of production.

#### *Establishment*

An establishment usually comprises the whole of the premises under the same ownership or management at a particular address, (e.g. a factory or mine). A fuller explanation is given in the reports on the census of production.

#### *Exports of goods and services*

These are sales of both merchandise and services to the rest of the world by United Kingdom residents. (Rent, dividends and interest received from abroad are excluded). The figures are the same as those used in the National Income Blue Book for 1960, which are based on balance of payments statistics.

#### *Final buyers*

Expenditure by final buyers comprises consumers' expenditure, public authorities' current expenditure on goods and services, gross fixed capital formation at home, the value of the physical increase in stocks and work in progress and exports of goods and services. (All these items are defined elsewhere in the Glossary). Total demand by final buyers is the same as *total final expenditure*.

#### *Final output*

This is that part of the *gross output* of each industry sold for final consumption by persons and public authorities, for investment (including additions to stocks and work in progress) and for export—that is output sold to *final buyers*. For the economy as a whole, *total final output* is equal to the total value of the goods and services (both home produced and imported) available for consumption, investment and export. Total final output is equal to *total final expenditure* (which is the same as total demand by final buyers), and can be regarded as the *gross output*, free from duplication, of the United Kingdom.

#### *Gross domestic income*

Gross domestic income is the income received by factors of production from current productive activity. In Table A it is reckoned before providing for *depreciation* and *stock appreciation*. Gross domestic income can be divided between *income from employment* on the one hand, and *gross profits and other trading income* on the other hand. Gross domestic income before providing for depreciation, but after providing for stock appreciation, is equal to *net output plus depreciation*. For the economy as a whole, gross domestic income before providing for depreciation but after providing for stock appreciation is equal to the *gross domestic product at factor cost*.

#### *Gross domestic product at factor cost*

This is a measure of the value of the goods and services produced in the United Kingdom, before providing for depreciation. It is equal to the aggregate of the net output *plus* depreciation of each industry. It can be regarded as the net output *plus* depreciation of the United Kingdom.

#### *Gross output*

The gross output of an industry is the aggregate value of the goods made and work done by the industry. It is equal to the value of the industry's sales *plus* any increase (and *less* any decrease) in the value of its stocks of finished products and work in progress. In Table A and in Table 1 the gross output of each industry is labelled the industry's *total output*.

In Table A and in Table 1 gross output is measured "free from duplication" in the sense that the output of establishments sold to other establishments within the same industry are excluded; consequently no figure appears in the leading diagonal in each table. The wider the definition of the industry the greater is the extent of the duplication of sales and purchases within each industry. Thus there is less duplication within the Motors and cycles industry group than within the Engineering and allied industries group, and less duplication within the Engineering and allied industries group than within manufacturing industry as a whole. Measuring gross output free from duplication makes it independent of the structure and

organisation of the industry and of the number of establishments in the industry for which returns are made. This definition of gross output does not correspond to that shown in the census of production where the figures relate to all sales by establishments, including those to other establishments in the same industry.

#### *Gross fixed capital formation at home*

This is expenditure on fixed capital assets (new buildings, vehicles, plant and machinery, etc.) either for replacing or adding to the stock of existing fixed assets. Expenditure on maintenance and repairs is excluded. This item is also called "gross fixed investment".

#### *Gross profits and other trading income*

This comprises gross trading profits of companies, gross trading surpluses of public corporations and of other public enterprises, rent and income from self employment. In Table 1 all these incomes are measured before providing for depreciation and stock appreciation.

#### *Imports of goods and services*

These are purchases by United Kingdom residents of both merchandise and services from abroad. (Rent, dividends and interest paid abroad are excluded). The figures are the same as those used in the National Income Blue Book for 1960 which are based on balance of payments statistics.

#### *Imports of merchandise (i.e.f.)*

Imports of merchandise (i.e.f.) are defined as in the *Annual Statement of Trade*, and their value includes the cost of insurance and freight. They differ both in timing and coverage from the figures of *imports of goods and services*. For a detailed description of these differences, reference should be made to the notes to the Balance of Payments White Papers.

#### *Income from employment*

This comprises wages, salaries, Forster's pay and employers' contribution to National Insurance and pension funds, etc.

#### *Industry*

The term "industry" or "industry group" is used in a very wide sense, as in the National Income Blue Book, to denote any branch of economic activity, including agriculture, distribution, transport and other services, public administration and defence, as well as the industries covered by the census of production.

The classification of industries followed in Table A and Table 1 is described in Appendix C.

#### *Intermediate output*

This is that part of the gross output of each industry sold to other industries for current use.

#### *National income*

This represents the aggregate of incomes arising from current production of goods and services. It is equal to the gross domestic product at factor cost less provision for depreciation plus net income from abroad.

#### *Net output*

The net output of an industry represents the industry's contribution to the national income. It is equal to the

value of the gross output of the industry less the cost of all the goods and services used by the industry in its current production, including the cost of providing for depreciation and stock appreciation. Depreciation is deducted in reckoning net output as it is a measure of the amount of fixed capital assets used up in the process of production.

The net output plus depreciation of an industry is equal to the gross domestic income generated by the industry, and represents the industry's contribution to the gross domestic product at factor cost. It also represents the value added by the industry to the goods and services used by the industry in its current production.

The definition of net output used here differs from the rather wider definition of net output used in the Census of Production, where it is taken as being equal to the value of the gross output of the industry less the aggregate of the cost of materials and fuel used and the amount paid for work given out and any transport payments made, no deduction being made for payments for other services or for depreciation.

#### *Net taxes on expenditure*

This item is equal to taxes on expenditure less subsidies.

#### *Primary inputs*

Primary inputs are those inputs which are not the intermediate outputs of other industries. In Table A and Table 1 these are: imports of goods and services, sales by final buyers, net taxes on expenditure and gross domestic income. Total primary input is equal to total final output.

#### *Principal products*

The principal products of an industry are those products commonly associated in production, and usually similar in nature or manner of production, in terms of which the industry is defined.

#### *Public authorities' current expenditure on goods and services*

This is current expenditure by both the Central Government and local authorities constituting a direct payment for goods and services, including the services of government employees. The figures exclude expenditure on grants, subsidies, interest payments and other transfers; expenditure on fixed capital assets and stocks; and loans and loan repayments.

#### *Sales by final buyers*

Sales by final buyers included in row 49 of Table A and shown in more detail in row 14 of Table 1, include (a) sales by industry of secondhand vehicles, ships, plant and machinery for scrap or to persons or for export, (b) payments by persons to the Central Government for goods and services provided under the National Health Services, (c) fees paid by persons to local authorities for various services (e.g. baths, libraries, parks, etc.), (d) export sales by the Central Government and (e) the timing adjustment on exports included in the Balance of Payments White Papers.

#### *Secondary products*

The secondary products of an industry are those products of an industry which are the principal products of other industries.

#### *Stocks and work in progress*

The change in the value of stocks and work in progress during the year is the difference between the book value of stocks and work in progress at the beginning of the year and the end of the year. It can be divided between stock appreciation on the one hand, and the value of the physical increase in stocks and work in progress on the other hand.

#### *Stock appreciation*

This represents that part of the change in the value of stocks and work in progress during the year which arises from increases in the prices at which stocks and work in progress are valued.

#### *Subsidies*

These are payments made by public authorities to a producer or trader with the object of reducing his selling price below the factor cost of production.

#### *Taxes on expenditure*

These include all "indirect" taxes paid to the Central Government which are related to the volume of production of, or trade in, particular goods and services, as distinct from taxes related to income or capital. They also include local rates paid to local authorities.

#### *Total final expenditure*

This is the sum total of consumers' expenditure on goods and services, public authorities' current expenditure on

goods and services, gross fixed capital formation at home, the value of the physical increase in stocks and work in progress, and exports of goods and services. (All these are defined elsewhere in the Glossary). Total final expenditure is the same as total demand by final buyers and is equal to total final output.

#### *Total input*

The total input of each industry is equal to the industry's total purchases of the intermediate outputs of other industries for use in current production plus its purchases of primary inputs.

#### *Total output*

The total output of an industry in Table A and in Table I is the same as the industry's gross output and is equal to the industry's total input.

#### *Value added*

The value added by an industry is equal to the net output plus depreciation of the industry.

#### *Value of the physical increase in stocks and work in progress*

This is the increase in the quantity of stocks and work in progress held by trading enterprises or by the Central Government for strategic purposes, valued at average prices of the year; it is equal to the change in the value of stocks and work in progress less stock appreciation.

## APPENDIX C

## CLASSIFICATION OF INDUSTRIES

The table below gives details of the composition and coverage of the industry groups shown in Table A. Each industry group is defined in terms of the old Standard Industrial Classification (1948). The Census of Production report numbers and names of the various industries are also shown.

Industry group	Standard Industrial Classification (1948) minimum list heading	Census of Production, 1954 report number
1. Agriculture, forestry and fishing .. .. .	1, 2 and 3	
2. Coal mining: Coal mines .. .. .	10	Vol. 1, A.
3. Other mining and quarrying: Non-metaliferous mines and quarries .. .. . Salt mines, brine pits and salt works .. .. . Slate quarries and mines .. .. . Metaliferous mines and quarries .. .. .	11 to 14 and 19	Vol. 1, B Vol. 1, C Vol. 1, D Vol. 1, E
4. Coke ovens and coal tar products: Coke ovens and by-products .. .. . Coal tar products .. .. .	20	Vol. 2, A Vol. 2, D
5. Chemicals and dyes: Dyes and dyestuffs .. .. . Fertiliser, disinfectant, insecticide and allied industries .. .. . Chemicals (general) .. .. . Explosives and fireworks .. .. .	31 and 33	Vol. 2, B Vol. 2, C Vol. 2, E Vol. 2, H
6. Drugs and perfumery: Drugs and pharmaceutical preparations .. .. . Toilet preparations and perfumery .. .. .	32	Vol. 2, F Vol. 2, G
7. Soap, polishes, etc: Soap, candles and glycerine .. .. . Polishes .. .. . Match .. .. .	35 (part)	Vol. 2, J Vol. 2, K Vol. 2, M
8. Mineral oil refining: Mineral oil refining .. .. .	36	Vol. 2, N
9. Oils and greases: Oils and greases .. .. . Seed crushing and oil refining .. .. . Glue, gum, paste and allied industries .. .. .	39	Vol. 2, O Vol. 2, P Vol. 2, Q
10. Paint, plastic materials, etc: Paint and varnish .. .. . Ink .. .. . Plastic materials .. .. .	31, 34 and 35 (part)	Vol. 2, I Vol. 2, L Vol. 2, R
11. Iron and steel—melting, rolling and castings: Blast furnaces .. .. . Iron and steel (melting and rolling) .. .. . Iron foundries .. .. . Steel sheets .. .. . Scrap metal processing (part) .. .. .	40, 41, 42, 43 (part) and 99	Vol. 3, A Vol. 3, B Vol. 3, C Vol. 3, D Vol. 3, H (part)

Industry group	Standard Industrial Classification (1948) minimum list heading	Census of Production, 1954 report number
12. Iron and steel—its plate and tubes: Tin plate .. .. . Wrought iron and steel tubes .. .. .	43 (part) and 44	Vol. 3, E Vol. 3, F
13. Non-ferrous metals: Non-ferrous metals (smelting, rolling, etc.) .. .. . Scrap metal processing (part) .. .. . Brass manufactures .. .. .	49 and 99	Vol. 3, G Vol. 3, H (part) Vol. 5, F
14. Motors and cycles: Motor vehicles and cycles (manufacturing) .. .. . Motor vehicles and cycles (repairing) .. .. .	80, 81 and 83 (part)	Vol. 3, I Vol. 3, J
15. Aircraft: Aircraft manufacture and repair .. .. .	82 and 83 (part)	Vol. 3, K
16. Railway rolling stock, etc.: Railway locomotive shops and locomotive manufacturing .. .. . Railway carriages and wagons and trams .. .. . Cars, perambulators, etc. .. .. .	84 to 89	Vol. 3, L Vol. 3, M Vol. 3, N
17. Shipbuilding and marine engineering: Shipbuilding and ship repairing .. .. . Marine engineering .. .. .	90 and 91	Vol. 4, A Vol. 4, B
18. Mechanical engineering: Machine tools .. .. . Textile machinery and accessories .. .. . Small arms .. .. . Constructional engineering .. .. . Mechanical handling equipment .. .. . Printing and bookbinding machinery .. .. . Mechanical engineering (general) .. .. . Mechanical engineering (repairing) .. .. .	92 to 99	Vol. 4, C Vol. 4, D Vol. 4, E Vol. 4, F Vol. 4, G Vol. 4, H Vol. 4, I Vol. 4, J
19. Electrical engineering (general): Electrical engineering (general) .. .. . Batteries and accumulators .. .. . Electric lighting accessories and fittings .. .. .	70, 74 (part), 75 and 79	Vol. 4, K Vol. 4, N Vol. 4, O
20. Radio and tele-communications: Electric wires and cables .. .. . Radio and tele-communications .. .. .	71 to 74 (part)	Vol. 4, L Vol. 4, M
21. Hardware and hollow-ware: Hardware, hollow-ware, metal furniture and sheet metal .. .. .	94 and 99	Vol. 5, E
22. Precision instruments, jewellery, etc.: Scientific, surgical and photographic instruments, etc. .. .. . Watch and clock .. .. . Jewellery and plate .. .. . Precious metals refining .. .. . Musical instruments .. .. .	100 to 103	Vol. 5, H Vol. 5, I Vol. 5, J Vol. 5, K Vol. 5, L
23. Miscellaneous metal manufactures: Tool and implement .. .. . Cutlery .. .. . Chain, nail, screw and miscellaneous forgings .. .. . Wire and wire manufactures .. .. . Needles, pins, fish hooks and metal smallwares .. .. .	90 to 93 and 99	Vol. 5, A Vol. 5, B Vol. 5, C Vol. 5, D Vol. 5, G
24. Cotton and man-made fibres: Cotton spinning and doubling .. .. . Cotton weaving .. .. . Rayon, nylon, etc. production .. .. . Rayon, nylon, etc. weaving and silk .. .. . Textile converting .. .. .	110, 111, 113, 114, and 244	Vol. 6, A Vol. 6, B Vol. 6, D Vol. 6, E Vol. 6, O
25. Woolen and worsted: Woolen and worsted .. .. .	112	Vol. 6, C
26. Hosiery and lace: Hosiery and other knitted goods .. .. . Lace .. .. .	118 and 119	Vol. 6, J Vol. 6, K

Industry group	Standard Industrial Classification (1948) minimum list heading	Census of Production, 1954 report number
27. Other textiles:	115 to 117, 120 to 122 and 129	Vol. 6, F Vol. 6, G Vol. 6, H Vol. 6, I Vol. 6, L Vol. 6, M Vol. 6, N Vol. 6, P Vol. 7, A Vol. 7, B Vol. 7, C
Flax processing .. .. .		
Linon and soft hemp .. .. .		
Jute .. .. .		
Rope, twine and net .. .. .		
Carpets .. .. .		
Narrow fabrics .. .. .		
Canvas goods and sacks .. .. .		
Made-up household textiles .. .. .		
Asbestos .. .. .		
Flock and rag .. .. .		
Hair, fibre and kindred industries .. .. .		
28. Textile finishing and packing:	123	Vol. 6, Q Vol. 6, R
Textile finishing .. .. .		
Textile packing .. .. .		
29. Leather and fur:	130 to 132	Vol. 7, D Vol. 7, E Vol. 7, F Vol. 7, G
Leather (tanning and dressing) .. .. .		
Fellmongery .. .. .		
Leather goods .. .. .		
Fur .. .. .		
30. Clothing:	140 to 143 and 147	Vol. 7, H Vol. 7, I Vol. 7, J Vol. 7, K
Tailoring, dressmaking, etc. .. .. .		
Hats, caps and millinery .. .. .		
Gloves .. .. .		
Umbrellas and walking stick .. .. .		
31. Boot and shoe:	148	Vol. 7, L
Boot and shoe .. .. .		
32. Cereal foodstuffs:	150 to 152 and 162 (part)	Vol. 8, A Vol. 8, B Vol. 8, C Vol. 8, C Vol. 8, E
Grain milling .. .. .		
Bread and flour confectionery .. .. .		
Rice .. .. .		
Cattle, dog and poultry feeds .. .. .		
Starch .. .. .		
33. Other manufactured foods:	153 to 157 and 162 (part)	Vol. 8, D Vol. 8, E Vol. 8, F Vol. 8, G Vol. 8, H Vol. 8, I Vol. 8, J Vol. 9, A Vol. 9, B Vol. 9, D Vol. 9, F Vol. 9, G
Bacon and curing and sausage .. .. .		
Preserved meat .. .. .		
Milk products .. .. .		
Ice cream .. .. .		
Sugar and glucose .. .. .		
Cocoa, chocolate and sugar confectionery .. .. .		
Preserved fruit and vegetables .. .. .		
Margarine .. .. .		
Fish curing .. .. .		
Vinegar and other condiments .. .. .		
Ice .. .. .		
Miscellaneous preserved foods .. .. .		
34. Drink and tobacco:	163, 164, 168 and 169	Vol. 9, H Vol. 9, I Vol. 9, J Vol. 9, K Vol. 9, L Vol. 9, M
Brewing and malting .. .. .		
Wholesale bottling .. .. .		
Spirit distilling .. .. .		
Spirit rectifying and compounding .. .. .		
Soft drinks, British wines and other .. .. .		
Tobacco .. .. .		
35. Timber and furniture:	170 to 173 and 179	Vol. 10, A Vol. 10, B Vol. 10, C Vol. 10, D Vol. 10, E
Timber .. .. .		
Furniture and upholstery .. .. .		
Soft furnishings .. .. .		
Shop and office fixtures .. .. .		
Wooden containers and baskets .. .. .		

Industry group	Standard Industrial Classification (1944) minimum but heading	Census of Production, 1954 report number
36. Paper and board: Paper and board .. .. . Wallpaper .. .. . Cardboard box, carton and fibre-board packing case .. .. Manufactured stationery, paper bag and kindred industries ..	180 to 183	Vol. 10, F Vol. 10, G Vol. 10, H Vol. 10, I
37. Printing and publishing: Newspaper and periodical printing and publishing .. .. Printing and publishing, bookbinding, engraving, etc. ..	185 and 189	Vol. 10, J Vol. 10, K
38. Rubber: Rubber .. .. .	190	Vol. 11, A
39. China and glassware: China and earthenware .. .. . Glass containers .. .. . Glass (other than containers) .. .. .	21 and 22	Vol. 1, G Vol. 1, H Vol. 1, I
40. Building materials: Brick and fireclay .. .. . Cement .. .. . Building materials (including roofing felts) .. .. .	20, 24 and 29 (part)	Vol. 1, F Vol. 1, J Vol. 1, L
41. Miscellaneous manufactures: Linoleum, leathercloth and allied industries .. .. . Brushes and brooms .. .. . Toys and games .. .. . Sports requisites .. .. . Miscellaneous stationers' goods .. .. . Cinematograph film production .. .. . Cinematograph film printing .. .. . Plastic goods and fancy articles .. .. . Incandescent mantles .. .. . Abrasive .. .. . Manufactured fuel .. .. .	29 (part), 191 to 195 and 199	Vol. 11, B Vol. 11, C Vol. 11, D Vol. 11, E Vol. 11, F Vol. 11, G Vol. 11, H Vol. 11, I Vol. 11, J Vol. 1, K Vol. 1, M
42. Building and contracting: Building and contracting .. .. . Local authorities (building and civil engineering) .. ..	200 to 202	Vol. 12, A Vol. 12, B
43. Gas and water: Gas supply industry .. .. . Water undertakings .. .. .	210 and 232	Vol. 12, F Vol. 12, H
44. Electricity: Electricity supply industry .. .. .	231	Vol. 12, G
45. Services: Transport and communication .. .. . Distributive trades .. .. . Insurance, banking and finance .. .. . Other services (excluding those in industry group 46) .. ..	S.I.C. Orders xix, xx, xxi (part) xxii (part) and xxv (part)	
46. Public administration, etc: Public administration and defence .. .. . Public health and educational services .. .. . Ownership of dwellings .. .. . Domestic services to households .. .. . Services to private non-profit-making bodies serving households	xxi (part), xxii, xxiii (part) and xxiv (part)	

The definitions of the major industry groups in Table 1 (the summary input-output flow table) follow the revised *Standard Industrial Classification (1956)* and correspond to the definitions followed in the *National Income Blue Book* for 1960.

Major industry group	Standard Industrial Classification Orders	Major industry group	Standard Industrial Classification Orders
Agriculture, forestry and fishing .. .. .	I	Textiles, leather and clothing..	X to XIII
Mining and quarrying ..	II	Other manufacturing ..	XIII to XVI
Food, drink and tobacco ..	III	Construction .. .. .	XVII
Chemicals and allied industries	IV	Gas, electricity and water ..	XVIII
Metal manufacture .. ..	V	Services .. .. .	XIX, XX, XXI (part), XXII (part) and XXIII (part)
Engineering and allied industries .. .. .	VI to IX	Public administration, etc. ..	XXI (part), XXII (part), XXIII (part) and XXIV

## APPENDIX D

## INVERTING THE MATRIX: A NUMERICAL EXAMPLE

This appendix sets out an example designed to illustrate in simple terms how the coefficients in each of the columns of Tables E and F could be derived from the figures in Table A.

For the purpose of this example the economy is divided into three industry groups A, B and C; their transactions are set out in the input-output flow table below.

Input-output flow table

		£				
Sales by	Purchases by	A	B	C	Final buyers	Total output
A	.. ..	—	—	70	30	100
B	.. ..	20	—	80	100	200
C	.. ..	20	80	—	200	300
Domestic income	.. ..	40	100	140	—	280
Imports	.. ..	20	50	10	30	70
Total input	..	100	200	300	360	960

In the table domestic income and imports are primary inputs and amount to £360. This, by definition, is also equal to total final output and to total demand by final buyers.

The table shows, for example, that in the year in question the output of industry A is bought partly by industry C and partly by final buyers. The *intermediate* output of industry A is thus determined initially by the output of industry C. The table shows that £300 of output by industry C requires on average £70 of output by industry A.

The intermediate output of industry A is, therefore, determined by the following equation:

$$\text{Intermediate output of A} = \frac{70}{300} \text{ of total output of C}$$

Similarly £100 of output of industry A requires £20 of output by industry B and £300 of output by industry C requires £80 of output by industry B. The intermediate output of B is thus determined by the following equation:

$$\text{Intermediate output of B} = \frac{20}{100} \text{ of total output of A} \\ \text{plus } \frac{80}{300} \text{ of total output of C}$$

Similarly £100 of A requires £20 of C  
and £300 of B requires £80 of C

The intermediate output of C is determined by the following equation:

$$\text{Intermediate output of C} = \frac{20}{100} \text{ of total output of A} \\ \text{plus } \frac{80}{200} \text{ of total output of B}$$

The total requirements of £1,000 of final output by say

industry C can be determined by solving the following three equations:

$$\begin{aligned} A &= \frac{70}{300} C \\ B &= \frac{20}{100} A \text{ plus } \frac{80}{300} C \\ C &= 1,000 \text{ plus } \frac{20}{100} A \text{ plus } \frac{80}{200} B \end{aligned}$$

The solution to these simultaneous equations is as follows:

$$A=282; B=378; \text{ and } C=1,208$$

This means that £1,000 of final output by industry C requires on average the following gross outputs by the three different industries:

	£
Industry A	282
Industry B	378
Industry C	1,208

The imports required to enable industry C to produce £1,000 of final output are determined as follows:

Gross output	Ratio of imports to gross output (from Table A)	Imports
£		£
Industry A	282/100	57
Industry B	378/200	19
Industry C	1,208/300	40

Total imports 116

The total requirements per £1,000 of final output by industry C are as follows:

	£
Industry A	282
Industry B	378
Industry C	1,208
Imports	116

These requirements correspond to the figures of total requirements given in the columns of Table E and are in terms of industries' gross outputs. In terms of their net outputs the total requirements of £1,000 of final output by industry C can be determined as follows:

Gross output	Ratio of net output to gross output	Net output
£		£
Industry A	282/40/100	113
Industry B	378/110/200	207
Industry C	1,208/564/300	564
Imports		116
Total		1,000

These figures correspond to those given in the columns of Table F.

The total net output (£884) is equal to the incomes generated within the country—the gross domestic product at factor cost.

The pattern of transactions implied by these figures of gross output, net output and imports are brought together in the following flow table.

The table shows the levels of output and of imports required to produce £1,000 of output by industry C. It may be observed that the percentage cost structure of each industry is necessarily exactly the same as in the original input-output flow table, and that total final output or final demand is equal to total incomes plus imports.

Total requirements per £1,000 of final output by industry C

£

Sells to Purchases by					
	A	B	C	Final output	Total output
A .. .. .	—	—	282	—	282
B .. .. .	56	—	322	—	378
C .. .. .	56	152	—	1,000	1,208
Domestic income	112	207	564	—	884
Imports .. ..	57	19	40	—	116
Total input ..	262	378	1,208	1,000	2,858

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TABLE I THE RESULTS OF THE ANALYSIS OF THE SPECTRA OF THE STARS OF THE CLUSTER OF THE GREAT DIAMOND SPRING		TABLE II THE RESULTS OF THE ANALYSIS OF THE SPECTRA OF THE STARS OF THE CLUSTER OF THE GREAT DIAMOND SPRING	
Star	Star	Star	Star
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	32
33	34	35	36
37	38	39	40
41	42	43	44
45	46	47	48
49	50	51	52
53	54	55	56
57	58	59	60
61	62	63	64
65	66	67	68
69	70	71	72
73	74	75	76
77	78	79	80
81	82	83	84
85	86	87	88
89	90	91	92
93	94	95	96
97	98	99	100

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*[The page contains dense, illegible handwritten text.]*

Year	Month	Day	Time	Location	Activity	Remarks
1998	Jan	1	10:00	St. John's Church	Worship	First service of the year.
1998	Jan	2	10:00	St. John's Church	Worship	Second service of the year.
1998	Jan	3	10:00	St. John's Church	Worship	Third service of the year.
1998	Jan	4	10:00	St. John's Church	Worship	Fourth service of the year.
1998	Jan	5	10:00	St. John's Church	Worship	Fifth service of the year.
1998	Jan	6	10:00	St. John's Church	Worship	Sixth service of the year.
1998	Jan	7	10:00	St. John's Church	Worship	Seventh service of the year.
1998	Jan	8	10:00	St. John's Church	Worship	Eighth service of the year.
1998	Jan	9	10:00	St. John's Church	Worship	Ninth service of the year.
1998	Jan	10	10:00	St. John's Church	Worship	Tenth service of the year.
1998	Jan	11	10:00	St. John's Church	Worship	Eleventh service of the year.
1998	Jan	12	10:00	St. John's Church	Worship	Twelfth service of the year.
1998	Jan	13	10:00	St. John's Church	Worship	Thirteenth service of the year.
1998	Jan	14	10:00	St. John's Church	Worship	Fourteenth service of the year.
1998	Jan	15	10:00	St. John's Church	Worship	Fifteenth service of the year.
1998	Jan	16	10:00	St. John's Church	Worship	Sixteenth service of the year.
1998	Jan	17	10:00	St. John's Church	Worship	Seventeenth service of the year.
1998	Jan	18	10:00	St. John's Church	Worship	Eighteenth service of the year.
1998	Jan	19	10:00	St. John's Church	Worship	Nineteenth service of the year.
1998	Jan	20	10:00	St. John's Church	Worship	Twentieth service of the year.
1998	Jan	21	10:00	St. John's Church	Worship	Twenty-first service of the year.
1998	Jan	22	10:00	St. John's Church	Worship	Twenty-second service of the year.
1998	Jan	23	10:00	St. John's Church	Worship	Twenty-third service of the year.
1998	Jan	24	10:00	St. John's Church	Worship	Twenty-fourth service of the year.
1998	Jan	25	10:00	St. John's Church	Worship	Twenty-fifth service of the year.
1998	Jan	26	10:00	St. John's Church	Worship	Twenty-sixth service of the year.
1998	Jan	27	10:00	St. John's Church	Worship	Twenty-seventh service of the year.
1998	Jan	28	10:00	St. John's Church	Worship	Twenty-eighth service of the year.
1998	Jan	29	10:00	St. John's Church	Worship	Twenty-ninth service of the year.
1998	Jan	30	10:00	St. John's Church	Worship	Thirtieth service of the year.
1998	Jan	31	10:00	St. John's Church	Worship	Final service of the year.

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